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Thanksgiving

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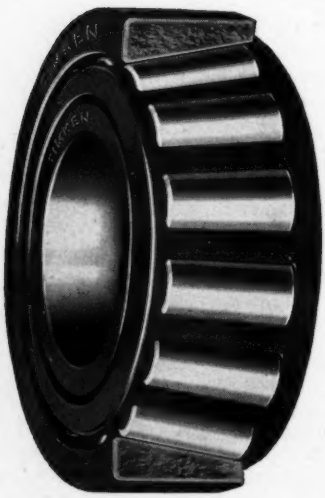

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York

VOLUME XI NUMBER FIVE

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Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER

"As tall as the wild asters,
So deep will be the winter snow."

Better Crops with PLANT FOOD

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VOL. XI NEW YORK, NOVEMBER, 1928 No. 5

Do you celebrate Thanksgiving
by deliberately overeating?

Victuals

By Jeff McDermid

VICTUALS have fascinated me ever since I can remember, and probably I had a hankering for them a long time before that. My well-known penchant for regularity and capacity originated in my bib days in the high chair. Sustenance has been a flaming passion with me from my youth. By the way, youth is indeed a glorious period because somebody else pays the grocery bills!

When we reckon our family expense accounts these days, we may decry certain youthful whims that run into money, but far be it from us to deplore abundant appetites and normal metabolism. When we start complaining about the rapid depletion of the post toasties and the animal crackers, let us call to mind the way we used to reach the bottom of the sauerkraut barrel and empty the pancake batter bowl back in the days of Grover Cleveland, free trade, and fried hominy!

A food provider and a food cooker in the kitchen is as important to America as a food administrator in the White House. Making America safe for the vitamins is more serious than the Monroe Doctrine.

When the sultry summer gives way to winter and our jaded appetites rise higher with every falling leaf, we usher in the season of bilious attacks by observing Thanksgiving.

At Thanksgiving we loosen our belts and overeat deliberately just to celebrate the fact that we are not obliged to starve. It also puts us in training to withstand the "eat more" campaigns of the millers, butchers, orange growers, and cranberry merchants without counting either cash or calories.

Producers who argue that the national tendency to boyish waists and slender shanks piles up the awful agricultural surplus beyond hope of economists or legislators should pause to consider something vital. The constant campaigns of competition by those who would have us nibble here and gnaw there at everything eatable have worn us thin through *diversified consumption.*

I know from experience, for I have tried to be patriotic and considerate of the terrible situation of the producer, and I have carried home kumquats and tangerines, pomegranates and pickled pigs' feet, cottage cheese and Bulgaricus milk. I have eagerly scanned the pages of national magazines, eschewing spearmint and all candies, for the purpose of lending my best efforts at national farm relief. If your food business has not revived, it must be because you failed to attract me by well placed contact advertising. It is not too late yet, for my dietary budget still has room for more than my stomach. But if Heinz or Squire Dingee adds one more pickle to the family tree, I am undone!

NOW in all this I verily believe that I have done more for farm relief than some of my bucolic neighbors who massage bovine udders for their daily bread and milk. Knowing that I am short on fat and they are shy on protein, the vicarious friends of mine who till the soil so assiduously have spread their crusts with lard, sold me the cream, and kept the skim milk for their children. But enough of this for the nonce!

Contrary to popular notion, Fanny Farmer, Doc McCollum, Benarr McFadden, and Doc Wiley did not originate victuals. "Victuals," according to my handy volume on "English In Spite of Ourselves," is considered to be "colloquial and dialectic." However, in spite of food fads and linguistic propensities, I shall stick to the same word that Jeremiah uses in Chapter Fifty-four, Verse Seventeen, because anything that was digestible in the days of King James' version deserves no better word to describe it.

IF you have not mislaid it, look in your Bible at the Twenty-ninth and Thirtieth Chapters of Genesis, which is the book that follows right after the family record your mother kept in the fly-leaf. From the wording in those memorable verses we gain an idea that food was one of the first things to be considered in planning the universe. It took only six days and twenty-eight verses to reach it.

From thence onward in tracing the march of Israel from the plains of Zoar into Egypt and thence to Hoboken and Jersey City, it is one long riot of victuals, interspersed with feast and famine and tempered with goat cheese, unleavened bread and kosher meat. Fruit brought back by the scouts led the folks into the Promised Land. Solomon lived long on the earth because he had so many wives to keep him in soup and well supplied with stew. The whole story of Joseph and his brethren is an epic of eats. And even before all that occurred, the fall of Adam came through his appetite for apples.

Powerful as they are in storied history, the careers of the Assyrians, Attila the Hun, Tiglath Pileser, Alexander the Great, Haroun al Rascid, and John L. Sullivan would have been of little moment in the absence of the elixir of life that lies in the larder.

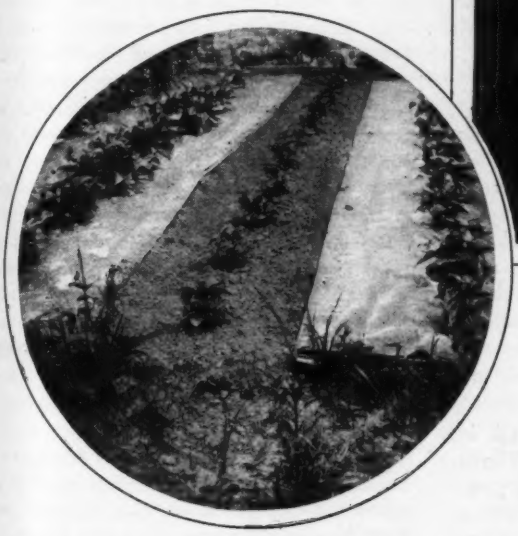
(*Turn to Page* 61)

Paper Money

By L. S Richardson

U. S. Department of Agriculture

Dr. L. H. Flint, Bureau of Plant Industry, U. S. D. A.



Left: Green beans mulched and unmulched.

"PAPER money" can now be made in the backyard garden and on the farm as well as in Uncle Sam's printing and engraving plant in the Nation's capital. And it is no crime to make it!

Rather it would seem to be criminal negligence on the part of modern agriculturists to overlook the opportunities of making money from paper the new way. The accepted method is by the use of an impervious, black asphalt-coated paper for mulching various garden and field crops.

Taking a tip from the pineapple farmers of Hawaii who use miles of mulching paper between the long rows of plants, thereby increasing the yield of the fruit by 30 per cent or more and eliminating much of the usual weeding in their fields, Dr. L. H. Flint of the United States Department of Agriculture has been conducting experiments with paper mulch to determine its effects on numerous different crops grown in the United States.

Paper mulch has proved so effective in pineapple culture that the practice is now an acknowledged asset, and more than 90 per cent of the Hawaiian pineapples are grown under paper. The industry in the past year paid in the neighborhood of $500,000 for mulching paper—an impressive testimony to its usefulness and profitableness, says Doctor Flint.

Since the practice first became of economic importance in Hawaii five years ago, experiments have been conducted in widely separated regions of

the world with the result that the paper has proved effective in stimulating plant growth and suppressing weed growth under varying conditions of soil and climate. Doctor Flint has completed four years' tests with numerous crops on the Department's proving grounds at Arlington, Va., and concludes that the paper mulch can be expected to give a definite and appreciable increase in yield of many different crops. Furthermore, he says, it appears quite rational to expect an economic future for the mulch in growing certain types of plants in certain localities. One of the most promising ways in which the practice may be used with profit is in the small home garden.

Grew Many Crops

In most of his trials Doctor Flint used an asphalt-coated paper that was impervious to water and of the strength of the pineapple paper. Such a paper is made to last through the several years of the pineapple plantation and is much heavier than would be needed for one season's use. It is possible, he believes, that a cheaper paper may be made which will be satisfactory for small gardens and truck farms.

Using the black, asphalt-coated, impervious paper, cut into strips 18 inches wide, Doctor Flint grew such crops as potatoes, beans, carrots, sweet corn, tomatoes, cabbage, turnips, peanuts, beets, and celery. The seeds or plants were put along the edge of a strip of paper laid across the test plot, the next strip of paper being laid down to allow about an inch of uncovered soil between strips for the plants. Strip after strip was laid until the entire area was covered and the crops planted in rows 18 inches apart. The paper was held down by placing sticks or stones on it, or in some cases with long wire staples.

In 33 trials with 12 different crops grown more than one season, the mulched plots showed an increase in yield over the unmulched check plots. Of 14 crops tested but one season, 12 showed a favorable response to the mulch. In fact, in only two instances in all of these trials was an unfavorable response noted—once in a late planting of field corn in 1924 and again in a planting of peanuts in 1927. Subsequent tests with corn proved favorable, and the failure with peanuts has been attributed to the lack of enough space between the paper strips to permit a satisfactory soil coverage for the developing fruits.

While most crops have been stimulated by the mulch, different crops showed a difference in the nature of the response. With such crops as lettuce or cucumbers germination was hastened on the mulched areas to such an extent that plants were very noticeable long before any had appeared on the unmulched plots. Furthermore, on certain soils where the crust was hard the mulched areas showed an increase in number of germinating plants due to the moist condition of the soil under the paper. With other crops, such as beets and swiss chard, when the soil was relatively fertile the unmulched plants often caught up with the mulched plants by the end of the season; in other cases the same plants grown on a poor soil without mulch never attained the vegetative development reached by the mulched plants.

Early maturity is a desired feature in some instances particularly where it is advantageous to reach the market before the regular run of crops appears. Mulched sweet corn plants in these trials have reached the peak of the yield about 10 days earlier than unmulched plants. Potatoes in these tests flowered from 7 to 18 days earlier on mulched plots than on the check plots.

Another promising feature of the mulching practice is in the possibility of growing certain crops far north of their accustomed place of growth. In cooperation with Doctor Flint, a Vermont farmer grew sweet potatoes under paper that compared favorably with tubers produced in their normal habitat. On the other hand the tubers grown alongside the mulched area were small, irregular in shape, and generally unfit

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MICHIGAN

Experiment Station

By A. J. Patch

Agricultural Editor, Michigan State College

THE rapidity with which knowledge in the field of scientific agriculture has been attained at the experiment station of the Michigan State College can be judged by the outlines of experiments referred to its first director and by reports on these experiments found in the station reports made during the early years of the station.

The experiment station was organized February 26, 1888. While awaiting funds to finance experimental work, Edwin Willits, president of the college who had been made director of the station, requested the members of his staff to submit outlines of the experiments which they wished to conduct. His staff members were R. C. Kedzie, chemist; A. J. Cook, zoologist; W. J. Beal, botanist; Samuel Johnson, agriculturist; L. H. Bailey, horticulturist; and Henry Reynolds, secretary-treasurer.

In presenting his outline of experiments, Doctor Kedzie stated his desire, "to conduct some analyses of ensilage corn at the various stages of maturity, to test its value as a food for animals; also to continue experiments relating to inert nitrogen; also research as to the effect of tile draining on rainfall and drought."

The station entomologist planned to "work out the full life history of noxious insects, now known, but imperfectly understood; and to experiment with insecticides, and methods to prevent insect destruction."

Dr. W. J. Beal erected a lightning rod to draw the thunderbolts of the unbelievers when, in his outline of contemplated experimental work, he suggested reforestation projects in a State which then echoed to the crash of falling trees and the shriek of sawmills.

The Agricultural Building, Michigan State College.

The list of the station agriculturist suggested "field experiments embracing different methods of preparing soil for crops; the implements best adapted to the work; results from different amounts of seed; results from different methods of cultivation; and testing of various fertilizers

with different methods and times of application."

The importance of the horse to the farmers in 1888 is intimated by the suggestion of the station veterinarian that he "experiment with horses afflicted with heaves; and to study the 'germ theory' of disease."

Liberty Hyde Bailey, horticulturist, submitted a list of experiments which were the foundation for the work of a lifetime, although most of this work has been performed in New York where he took up his duties later in the year.

The First Reports

In his report of work done during the first year at the Michigan station, Dr. R. C. Kedzie wrote, "the sampling and analyzing of commercial fertilizers has been systematically carried forward by this department. Most of the manufacturers cheerfully comply with the law, and protect their agents by paying promptly the fee necessary for a permit to sell."

The list of fertilizers given shows that the value of brand names was well understood in 1888. Celery Grower, Garden Vegetable Compound, Challenge Corn Grower, and World of Good Superphosphate were leading brands at that time.

The station entomologist reported, "during the past year, and to a less extent for two years, I have noticed many potatoes grown on low land that were so scabby that one could with difficulty place his finger on the potato without touching one of these rough excrescences. In many cases the potatoes were badly bored by wireworms, grubs of elater beetles. In some the mole cricket had burrowed. I think that Prof. Arthur has shown that this scab is not due to fungus attack. Mr. Carman thinks he knows that in some cases myriapods, or the so-called thousand-legged worms, have caused this scab. I am just as sure that I know of cases where potatoes were quite scabby, and where the most careful examination could find no myriapods at all. Another summer I shall take great pains to learn what is the truth in the matter. If by planting on soil free from insects we can avoid scab, it will be a matter of great importance."

Oscar Clute became director of the station in 1889 and acted in that capacity until Lewis G. Gorton succeeded to the position in 1894. The station came under the direction of Clinton D. Smith in 1895, and he directed its policies until 1908. Robert Sidney Shaw took charge of the station then and continued as station director until 1928, when upon his election to the presidency of Michigan State College, Joseph F. Cox became dean of agriculture and Victor R. Gardner was chosen director of the experiment station.

The work of the experiment station is now so extensive that the correlation of its activities and the direction of its policies are a full-size burden. The last list of the station staff contains the names of 108 members. Experimental work is carried on in a great many projects due to the varied list of farm crop and livestock interests that are of importance in Michigan.

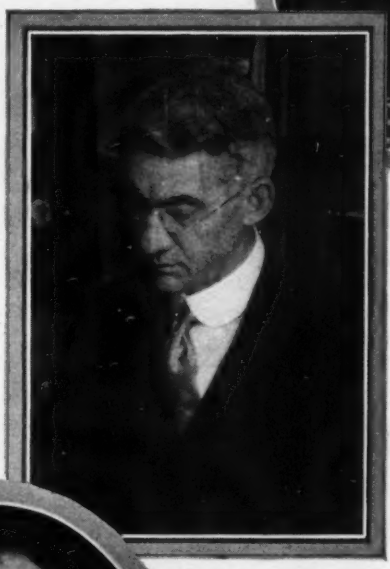
Research workers in the botanical section of the experiment station are called upon continuously to study plant diseases and to recommend means of disease prevention or of lessening the damage done by plant diseases. The Wolverine State produces a line of crops which not only includes those produced in most other sections, but, also, such unusual ones as chicory, ginseng, rhubarb, celery, peppermint, and Christmas trees. As in a human family of unusual size, some of the individuals of Michigan's crop family are often attacked by disease and the plant pathologists strive to be able to prescribe a practical treatment.

Recent studies by members of the department have aided materially in the treatment of diseases of the raspberry, sugar beets, beans, potatoes, cel-

ery, and vegetables. One of the research men found that certain diseases of the raspberry are spread by aphids which feed upon diseased plants and then move on to healthy ones. Two common diseases of vegetables which have been stored or shipped were proved to be caused by lack of oxygen, and the troubles can be prevented by providing adequate ventilation. A disease resistant celery has been selected which makes it possible for growers to produce a crop in areas where Fusarium has made ordinary varieties unprofitable.

Soils research men in many experiment stations have been aided in their investigational work by the discoveries of the hydrometer method of determining the colloidal or clay content in a soil and the alcohol method of determining soil moisture content. Both of these methods were worked out by one of the Michigan station staff. Methods of determining by simple field tests whether or not a soil is acid and also whether a soil is deficient in available phosphates have also been worked out by a member of the soils department.

Victor R. Gardner, Director of the Michigan Experiment Station.



Robert Sidney Shaw, President of Michigan State College.

Joseph F. Cox, Dean of Agriculture, Michigan State College.

The test for soil acidity is used by extension men in many states and the materials are manufactured commercially; the test for phosphorus was perfected recently and is being checked thoroughly before being distributed for general use. Both of the tests are simple enough so that they can be worked by the average individual and the needed equipment can be carried in a pocket.

Recent studies by members of the department have shown that the common conception of why soils heave during freezing weather is wrong. The expansion of water during freez-

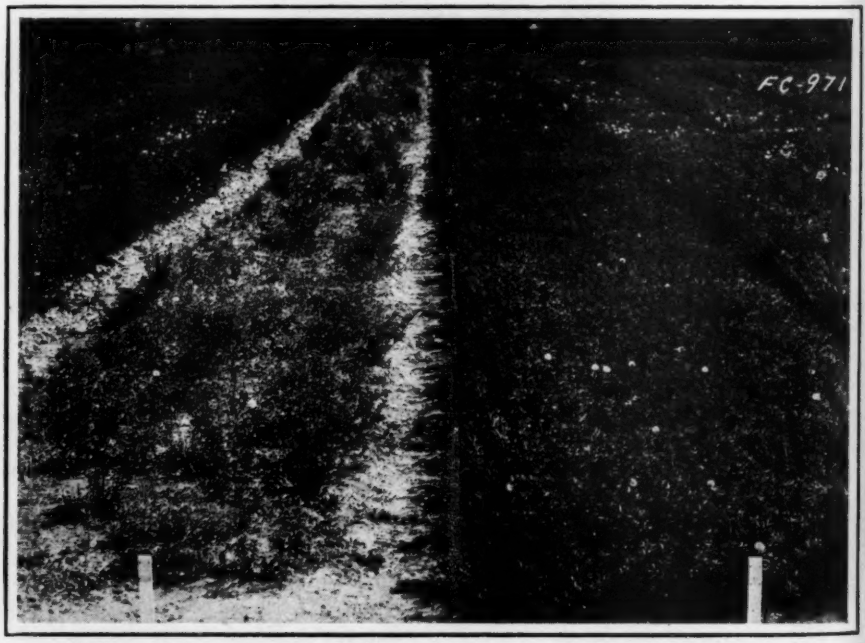
ing is not responsible for the heaving of soil. The dislocation of the surface soil is caused by the formation of ice crystals in the soil and the subsequent growth of these crystals by the attraction of water from deeper in the soil. The crystals force the surface soil layer up as they grow in size. A well-drained soil will heave less than one saturated with water.

The research staff has also found that there is a relation between the amount of phosphorus contained in the juice pressed from a plant and the amount of available phosphorus present in the soil upon which the plant grew. Comparatively large amounts of phosphorus are collected in the cell sap of plants that are grown on soils where there has been a recent application of a fertilizer that contained phosphates.

Another problem under investigation is the practicability of the row method of applying lime to acid soils. The ordinary method of applying lime is to spread the material broadcast, which necessitates the use of large quantities per acre. The studies carried on by the department for several years indicate that equal results can be obtained by the use of a comparatively small amount of lime applied in the rows.

The study of the uses, methods of application, and the proper analyses of fertilizers for use on certain crops and in different sections of the State is complicated by the fact that there are more than 30 common soil types which range from blow sand to heavy clay. Fertilizer recommendations can not be made on a basis of experiment station plat trials without checking the results in field trials on varying soil types.

To supplement the fertilizer trials made on the station plots, tests are made with various crops on many soil types in different parts of the State. Some of these trials are placed on farms where the owner can be depended upon for full cooperation, and others are placed on sub-station property which belongs to the College. In either case, the trials are under the immediate supervision of some member of the soils department.



Alfalfa varietal tests for winter hardiness. The variety on the left shows winter-killing.

Wheat varietal tests, Michigan Agricultural Experiment Station.

One of the most interesting of the series of fertilizer trials has been conducted on the Cass County Farm, near Cassopolis. This farm 12 years ago had been cropped until it was impossible to get a profitable yield of any grain crop or to get a satisfactory stand of clover. The College soils department was asked for advice on building the soil up to a productive state, and as the soil on the farm was a type of sand common in Michigan, the department began a series of field trials which could be used as a basis for recommendations for the use of fertilizers on similar types of soil.

The soil on this farm was so impoverished that lime, fertilizers, and green manure crops have all been used in the soil improvement campaign. The average yield of wheat and rye on the land where all three means of soil improvement have been used has been 24.5 bushels per acre. Where the soil has received no treatment, the yield has been 7.5 bushels. During the last five-year period, the yields on the plots under treatment have been 32 bushels per acre, and, where no treatment has been given, the yield has been 6.7 bushels.

The value of the increased yields of crops on the treated fields has been $65 per acre during the 12-year period. All expenses of applying fertilizers, lime, and green manure crops were deducted from the returns from the crops in computing the profit per acre.

In other field trials on the Hillsdale type of soil, an application of 200 pounds of 2-16-2 increased barley yields 15.4 bushels per acre. A similar application on oats gave an increased yield of 13.2 bushels. On potatoes, 500 pounds per acre of the same fertilizer increased the yield from 97 bushels on the check plot to 147.4 bushels on the fertilized portion of the field.

In a cooperative field test conducted on the farm of Mr. W. C. Armstrong, Hillsdale, Mr. Armstrong reports that the use of 100 pounds of ammonium sulphate on permanent pastures increased the worth of the pasture four

to five dollars per acre. Superphosphate, used at the rate of 250 pounds per acre, increased wheat yields eight bushels per acre, and the wheat on the fertilized area weighed 63 pounds per bushel while that on untreated soil weighed 58 pounds. The profit per acre from the use of fertilizers was computed by Mr. Armstrong to be $16.70.

For many years, the soils department at Michigan State College has advocated the use of high grade fertilizers, and the latest available figures prepared by the State analyst show that only 17 per cent of the fertilizers used in Michigan during that year were low grade. Figures from other sources in the State show that the amount of fertilizer used in Michigan steadily increases each year.

Valuable Work on Muck

In addition to the many types of upland soil in Michigan, there are millions of acres of muck in the State, and the muck shows a great deal of variation. The Michigan station has done a great deal of work to determine the proper fertilizers to use on muck and to find the best means of protecting crops on this soil from wind-injury.

Most of the Michigan celery, mint, and onions are grown on muck, but the use of this soil is not restricted to these special crops. Most of the root and forage crops produce good yields on muck if a proper system of fertilization is followed. Sub-stations for muck soil experiments are maintained in many of the counties which have a fair area of this soil.

Test plots in Allegan county show that the addition of 300 pounds of superphosphate increased the yields per acre of alfalfa .5 tons; of carrots, 1.2 tons; and potatoes, 3.6 bushels. The increase in yields secured by using 300 pounds of muriate of potash were: alfalfa, 1.3 tons; carrots, 1.2 tons; mangels, 12.9 tons; and potatoes, 44 bushels. When 300 pounds each of superphosphate and potash were used, the potato yield was increased 121 bushels per acre above the check plots which were not fertilized.

In Clinton county, an application of 750 pounds of potash on onions increased the yield of marketable onions 192 bushels per acre, and decreased the percentage of immature onions 17.8 per cent. An application of 750 pounds per acre each of potash and superphosphate increased the onion yield 512 bushels per acre and decreased the percentage of immature onions 34.1 per cent as compared with unfertilized areas.

In addition to the increased yields obtained from fertilizing crops on muck land, the hastening of maturity of the crop is very important. Muck soils are especially liable to be visited by early frosts in Michigan. Fertilizer plots were placed in a field of late corn planted on sod, a part of which had been manured. The yield of good corn was increased 36.7 bushels per acre on the plots which received an application of potash at the rate of 250 pounds to the acre.

Need Windbreakers

High winds cause severe damage to crops on muck soil where no precautions are taken to protect the soil from wind action. The liability of wind-injury increases as the muck becomes decomposed into small particles after years of cultivation. The Michigan station has found that muck land crops can be protected from damage by the use of windbreaks obtained by planting rye in strips through the fields. The rye should be planted in strips at right angles to the path of the prevailing winds, the strips should be about 50 feet apart, and should contain five or six drill rows.

Sweet clover planted on the ditch banks gives protection to crops a considerable distance from the bank on the leeward side, and corn planted in single rows offers a measure of protec-

(*Turn to Page 57*)

Left: The difference in yield obtained in testing the two methods of applying fertilizer.

The RIGHT Way

By H. H. Gardner

CHARLES GRAHAM of Howard county, Indiana, found 51.8 bushels to be the difference in yield between two methods of applying fertilizer for corn on his farm. He is thoroughly convinced that there is a right and a wrong way to apply fertilizer.

After planting four acres of corn in part of the field in which the fertilizer had been broadcast with a grain drill, he was advised to apply the fertilizer in the hill with a corn planter. The same quantity, 100 pounds of 0-20-20 per acre, was used on the remaining 16 acres. Otherwise the field received the same cultural treatment.

The soil is a black clay loam very deficient in potash and characteristic of a large acreage in north central Indiana. The hill fertilized corn started quicker and from the very first grew more rapidly. In the part of the field receiving the fertilizer broadcast, the weeds outgrew the corn and were more difficult to control than where the corn received the fertilizer in the hill. Early in the season on the broadcast area, the plants showed typical symptoms of potash starvation. They grew slowly, the leaves were marginally fired and heavy deposits of iron were found in the nodal tissues. On July 26, the plants in the hill fertilized section were three feet taller and much greener than the plants in the broadcast rows. There never was any question during the season as to the value of the hill fertilization.

The difference in growth.

The real story, however, was told when the corn was harvested. The

(*Turn to Page 57*)

Sixty-two countries are members of the International Institute of Agriculture at Rome, which gathers and disseminates official reports on world agriculture.

Agriculture Today

I. ECONOMICS

By Frank George

Note: *The chiefs of bureaus of the United States Department of Agriculture were asked what they regard as the outstanding current agricultural problems with which their bureaus are dealing. Their replies, together with a statement as to what is being done toward the solution of these problems are covered in this series of articles.*

WHAT are the forces that affect the economic and social welfare of farmers, and how can farmers be enabled best to shape those forces?

These are among the outstanding problems with which the Bureau of Agricultural Economics is now dealing. There are factors, to be sure, over which farmers have no control; they cannot control the weather nor the buying power of consumers, but they can control acreage adjustments and the merchandising of their products to meet market requirements.

"A major difficulty with agriculture heretofore," according to Nils A. Olsen, recently appointed chief of the bureau, "has been the tendency to organize the farm business on the basis of existing conditions instead of on the basis of what conditions are likely to be at marketing time. Farmers almost invariably have gone into heavy production under the influence of prevailing prices and created price-breaking surpluses. We must organize on the basis of future prospects if the serious ups and downs of agriculture are to be smoothed out to yield every year a satisfactory financial return and high standard of farm living."

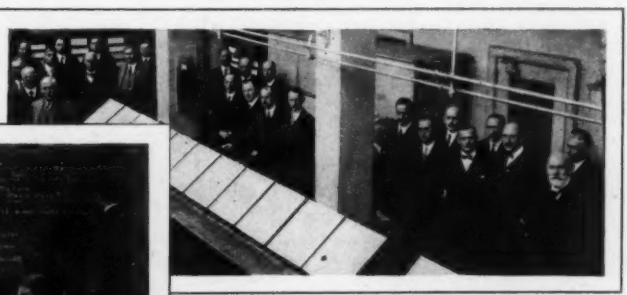
To look into the future and determine the farmers' best course of action calls for the highest type of economic research. Fundamental has been the demonstration that prices of agricultural products are not made by chance nor by the arbitrary decisions of any one man or group of men. They are the result of the interplay of the many economic elements that make up supply and demand; elements which can be ascertained and evaluated accurately.

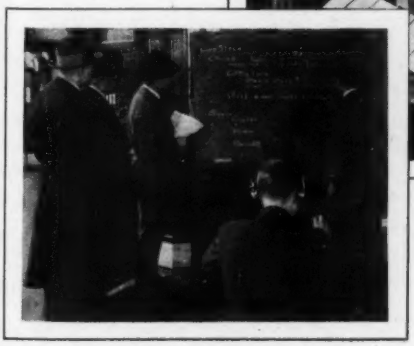
The first step in this type of research is to find out what are the principal factors that determine prices. Extensive research has been made by the bureau with specific commodities, including cotton, hogs, corn, apples, lambs, and other products. In each case the results of the analysis are tested by reconstructing prices over a series of years. This shows that while prices may get out of line with fundamental supply and demand conditions, they will remain out of line but a short time and will eventually return to the level determined by fundamental supply and demand conditions.

The supply part of the equation is made up of both domestic and foreign supply, inasmuch as agriculture is now an international business with American producers competing with foreign producers in world markets. To measure the supply calls for an efficient crop reporting system both here and abroad. The American crop reporting system has been in existence nearly 75 years, and has reached a high degree of accuracy; its statistical methods are being continually refined through research to make for maximum accuracy.

Difficulty has been experienced heretofore in securing accurate data of foreign crop production in time to be of value to American producers in measuring the competition which may be expected in world markets. In many cases estimates are not made until the crops are harvested. In the last few years, however, the Bureau of Agricultural Economics has been developing methods of forecasting foreign production. Climatic data and condition reports are analyzed to provide a basis for forecasting wheat crops in advance of the Government estimates in India, Italy, France, Germany, Argentina, and Australia. Thus, the Government estimates of the Argentine wheat crop have been anticipated by one month, the calculated forecasts being very close to the later official estimates. The outturn of crops in France and Germany also have been estimated fairly accurately several months in advance of the Government estimates.

On the demand side there are a multitude of factors which include chiefly the ability and willingness of consumers to buy. Close watch is kept





Above: Foreign delegates to a Washington conference on international cotton standards.

Left: Country banks bulletin the Federal market reports received by radio.

on general economic conditions both here and abroad and on the numerous factors which contribute to the general economic welfare. The state of industrial activity is continually measured and appraised in its effect on the demand for agricultural products. Consumer demand surveys are made to determine the preferences of consumers for the various products both with regard to quantity and quality.

Knowing what are the conditions as to demand, and knowing the best production program which will conserve the interests of American farmers, the bureau is in position to issue its so-called outlook reports which in reality are recommendations to farmers what acreages in the aggregate, of specified crops, it is advisable to plant. Similarly, recommendations are made with regard to livestock production. These recommendations are framed with a view to the ability of farmers to adjust acreages of alternate crops. Farmers may be told, for example, that an increase of ten per cent in wheat acreage, as indicated by farmers' own reports of intentions to plant, would, if average yields are secured, result in lower prices, whereas flax acreage may be increased profitably.

Prior to the planting season farmers are asked by the bureau to indicate what acreages they are planning to plant to various crops. The returns from this survey are considered by the economists in conjunction with all available economic data on the basis of which they can indicate the advisability or inadvisability of farmers' carrying out their intended plans. Evidence is accumulating that farmers are acting on this advice contained in the outlook reports issued by the bureau and by the extension services in many states. Better adjustment of acreages and livestock production is being manifested, a situation which has played no small part in the economic improvement of agriculture in recent years.

Knowing the relative value of the numerous factors that influence farmers' economic welfare, the bureau has established a program of emphasis upon each of them to enable farmers to secure the maximum return for their efforts. There is, for example, the bureau's whole standardization program under which standard grades have been established for practically all the important farm products. Quality of product having an important influence on price, farmers are urged constantly to produce quality and to market quality. They are being told to insist on payment on the quality basis instead of flat price basis.

Similarly, the market news service which, thanks to the radio in recent years, is broadcast from one end of the land to the other, gives farmers information upon which they can know the day by day supply and demand situation in the domestic and foreign markets, and thus be in position to determine their best immediate course of marketing action. This service enables them to determine when and where to sell to best advantage, and no buyer, so minded, nowadays can misstate the marketing situation, and get away with it for long at a time.

Producers, shippers, and cooperative organizations are using Federal and State market news services to effect the most desirable distribution. Market gluts are being prevented by regulating shipments to the various markets, and by more diversified distribution, instead of concentrating upon a few markets. Recently there have been developed "clearing houses" in various areas, notably in the Pacific Coast fruit regions, in which producers and shippers meet to study the market situation and arrange for the best distribution of their products.

The individual farmer does not expect the bureau to send an expert to analyze his farm business, but he does expect information on problems which are common to large groups of farmers. He wants to determine whether he is combining his land, labor, and capital in such proportion as to give him the maximum return? Is he us-

ing the most efficient machinery? What is the credit and loan situation? How measure the returns from labor and investment? What has the bureau learned about the problems of co-operative marketing?

What are the requirements for standard containers? Is it advisable to organize mutual farm insurance companies? What is the status of farm land values? How large an acreage of wheat, corn, flax, hay, and other crops are farmers planning to plant this year? Would it pay to increase livestock herds? What are the prospects for the dairy industry? Should corn be sold or fed? What are farmers planning with regard to hog production? Will the potato crop be too large for normal consumption requirements? And so on *ad infinitum*.

To be able to answer these questions intelligently involves projects from the comparatively simple determination of the dimensions of baskets in the enforcement of the Standard Containers Act to the more complicated multiple-correlations of advanced economics. But they are the type of practical questions which farmers are asking, and the answers to which they must look to their economic research agencies.

One fact produced by the agricultural depression following the war was the lack of adequate information on the economic factors that affect agriculture. Research had been confined largely to investigating the physical processes of marketing. It became apparent that if farmers were to reorganize on a sound basis, all of the economic influences upon agriculture must be studied. There has been assembled a body of data, study of which has gone far in permitting a correct analysis of the reasons for the agricultural depression and the planning of a course of action with the hope of preventing similar depressions in the future.

The big objective of the economists both in Federal and State research agencies is the organization of agriculture, so far as is within the power of farmers to do so, with a view to eliminating the violent fluctuations which have disrupted agriculture in the past and to make for uninterrupted financial and social satisfaction one year with another. This calls for facts regarding all phases of the farm business, and a thorough understanding of their significance.

Federal and state economists preparing outlook reports at Washington.

Spinach for Canning

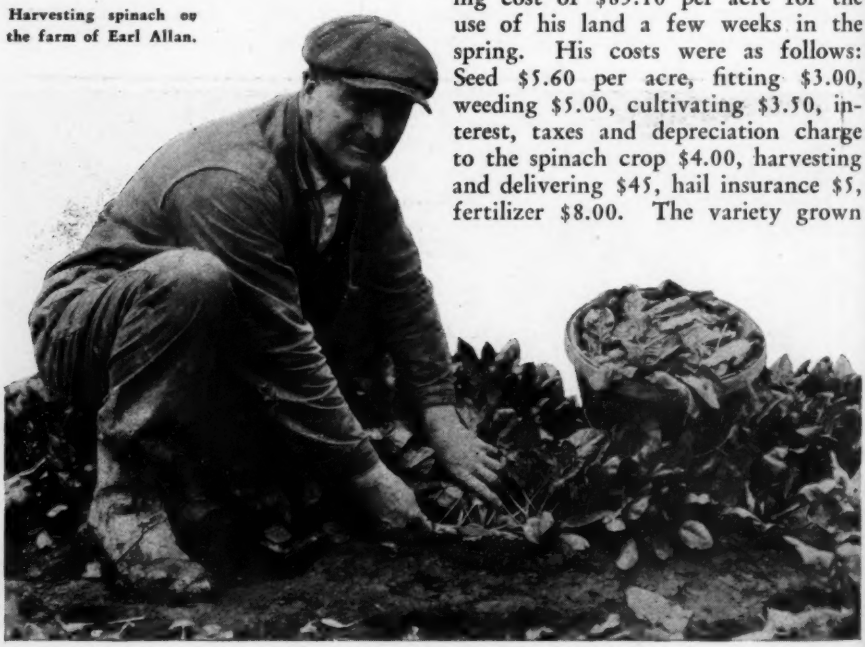
By M. D. Butler

County Agent, Marion, Indiana

GROWING spinach as a canning factory crop has real possibilities in certain places in Indiana, if the experience of a group of growers in southern Grant county is a fair indication. These farmers started three years ago following the instructions and help of the field department of the Snider Preserving Company, which in the past has been buying large acreages of this crop in New York. The company is now developing the crop in other parts of the country where insect pests are less troublesome or not yet introduced.

The business appeared at first to have little appeal to the busy general farmer. However during the last three seasons information on date of planting, fertilizer treatments, soil conditions, etc., has shown that in a great many cases the crop has a definite place in a farming scheme. This year in one community the company paid farmers more than $25,000 for spinach where three years ago they did not grow the crop commercially. Each farmer followed his crop with beets, sweet corn, alfalfa, or soybeans.

The most accurate and complete data on the crop are from the farm of Earl Allan who grew seven acres this year. Mr. Allan's average yield was six tons per acre making a gross return of $140 per acre with a growing cost of $83.10 per acre for the use of his land a few weeks in the spring. His costs were as follows: Seed $5.60 per acre, fitting $3.00, weeding $5.00, cultivating $3.50, interest, taxes and depreciation charge to the spinach crop $4.00, harvesting and delivering $45, hail insurance $5, fertilizer $8.00. The variety grown



Harvesting spinach on the farm of Earl Allan.

Carefully sorting spinach at the canning factory.

by Mr. Allan was King of Denmark. However tests on other farms this season indicate that Prickley Winter will partly take the place of the more common variety.

A unique feature of the devolpment of this acreage is shown in the contest held this year sponsored by the Snider Company. Each grower was entered in the contest and awarded cash prizes on the basis of freedom from weeds and the quality of the crop at harvest time. The judging was done by the county agent and the head field man of the company. The cash prizes were a bonus of 20 per cent for first, 15 per cent for second, and 10 per cent for third. The winners also will receive medals at the annual County Extension banquet. The contest has stimulated interest in the crop and interest in better farming.

Growing spinach commercially has its advantages in the Midwest where a local company can pack the product. Its chief advantage lies in the fact that spinach can be grown and harvested in the spring and the same area used by another crop the same season. It does, of course, seriously affect the fertility program on the farm although following spinach with a legume crop may somewhat overcome this loss.

The most common method of fertilizing the crop in Grant county consists of an application of 500 lbs. per acre of a complete fertilizer high in potash and low in nitrogen. The analysis used most commonly is a 2-8-10. This is applied immediately ahead of planting and is followed by two applications of 100 lbs. of nitrate of soda per acre. The nitrate is applied as side-dressing, the first being made when the crop is about one-third grown and the second about 10 days later.

Indiana has been termed the "State Without Crop Failures" largely because a greater diversity of production is found in Indiana than in other states. For many years a more diversified agriculture has been recommended on every hand, and it is now apparent that commercial spinach production can be made very profitable in certain localities.

Cucumbers on Cut-over

By H. E. Zimmerman

Mt. Morris, Illinois

IT must be admitted that it is a unique thing for a lumber company to go into the pickle business, but that very thing has been done in southern Mississippi. It has proved decidedly remunerative not only to the company but the farmers who raise the pickles for them.

Usually it is a problem to put cut-over timber land to profitable use. In this case the solution has been found in growing cucumbers, the work being placed in the hands of farmers of that section.

The Finkbiner Lumber Company of lower Mississippi has established as a subsidiary the American Pickle and Canning Company with headquarters at Wiggins, Miss. This company operates receiving stations for pickles all over southern Mississippi, from Jackson south to the coast. Last year it bought a quarter of a million bushels of cucumbers from the farmers and paid them in cash more than $300,000. In addition to cucumbers, which are made into pickles at the main plant at Wiggins, the company operates at Hattiesburg, Miss., the most modern canning plant south of the Ohio River. Spinach, beets, stringless beans, and sweet potatoes are bought from the farmers for canning, and new lines are being constantly added.

When this business was started a few years ago, the pickling and canning company had about 200 farmers growing cucumbers and other garden truck for them. Last year there were more than 5,000 farmers engaged in this line of work. Most of them did well and made a good profit on their pickles. The champion pickle grower of Mississippi, and probably of the South, is Bert Cupit of Eddiceton, Miss., who made a net profit of $190.39 on less than an acre. He fertilized this plot well and took good care of it through the growing season and, as a result, won this distinction and also a $50 cash prize. Another farmer made a net profit of $179.80 on an acre and won $35 as a prize. Two others made respectively $176.58 and $169.10, earning prizes of $25 and $15. Others made net profits from $162.53 down to $124.17.

These awards were made from actual records kept by the farmers themselves and witnessed by two disinterested people. The reports were graded on the basis of 75 per cent for yield and net profit and 25 per cent on neatness and completeness of record. There were many others who made a very good showing on growing cucumbers for pickles, but the few given were the best reports received.

The value of a given piece of ground is determined by the worth of that land in production. It therefore can be seen what direct bearing the pickling industry has on the price paid for cut-over land in that section of the country. Field men are out constantly advising and helping the farmers in every possible way. As the pickling company is a subsidiary of the lumber company, owners of large tracts of cut-over land, it does not exploit the farmers for what it can get out of them, but is trying to help them and is interested in the success they make. This kind of enterprise is particularly valuable when it is considered that this cash comes to the farmer in the spring of the year when he normally has very little income.

LIGHTNIN' *done struck* dat Cotton

By J. C. Pridmore

Soil Improvement Committee

Atlanta, Georgia

"LIGHTNIN' done struck dat cotton, boss," the negro farmer said when asked the cause of its condition.

"The 'lightnin' has been pretty bad in this section this year then, hasn't it?" the white men asked.

"Yessir, boss, it sho has," chimed in another negro farmer on the porch of the small cabin.

"Lightnin' or whatever it is dat causes dese dead spots," said the third negro, "has been wusser dis year dan I ever is seen it."

"White folks, dat cotton ain't been lightin' struck if'n some of dese other people do say so. Lightnin' ain't had nothin' to do wid it," said still a fourth colored man, who chimed in with the hope of imparting some exact knowledge concerning the real cause of the spotted conditions throughout that general section of South Carolina in Marlboro and adjacent counties with which he was familiar.

"What then caused the cotton to die in these large areas, some of which are circular, giving the impression that 'lightnin' has been the cause of the damage?" a white man asked.

"Boss, de white folks tell us dat dis is rust and wilt. It is wusser dis time dan its ever been befo'. We's beginning to believe dat the wrong fertilizer or not enough fertilizer of de right kind causes dis trouble. When we used to git kainit and cottonseed meal fertilizer we made fine cotton widout any trouble. Hit didn't have dese yere dead spots in it. De white folks don't give us no fertilizer wid kainit and cottonseed meal no mo', but done gone makin' us use potash in our fertilizer. Dis potash ain't no good! We sho did need some kainit dis year." Thus mused the tenant farmers as they sat upon the porch of the small cabin, describing conditions and giving the cause of these in their own language based upon their beliefs and observations during long-time practices.

The conditions under discussion, as

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The sweet clover at the right received a treatment of commercial fertilizer; that at the left, only lime.

Why Fertilize?

By A. A. Burger

Cedar Falls, Iowa

"WHEN I started in on soil improvement, I was willing to bet my boy that I could beat him growing crops without using any fertilizer by simply practicing a good rotation, including legumes and the liming of soils. I found that it could not be done. Now, it is no longer a question with me of whether I can afford commercial fertilizers, but rather, whether I can afford to do without them. I have found, with some little experience, that commercial plant food increases the yield of my corn from 10 to 15 bushels per acre and also that it has improved the quality."

This statement was made by Mr. Heuck, a farmer in northwestern Iowa, at the annual Farm-and-Home Week conference recently held at the Iowa State College at Ames. Peculiar and important significance attaches to it, for it is a conclusion that was reached after 10 years of practical farm fertilizer experience on some of the good land of the state, representative of the best land of the Corn Belt states. Nor are these the results simply of building up a worn-out soil This was a good farm, even as our best farms go. Heuck was a livestock farmer. He had made good use of his barnyard manure, for he had appreciated fully the value of soil fertility in reducing crop production costs. As nearly as possible he had been in the habit of applying eight tons of

manure to the land every two or three years, and in addition to that, he began to use commercial fertilizer.

Mr. Heuck found that good farming, rotations, manure, and limestone, were not enough.

With these he had been in the habit of getting 45 bushels of corn and 32 bushels of oats per acre. But when he made his start with fertilizer, he secured a yield of 65 bushels of corn and 50 bushels of oats per acre. The labor costs in producing these crops remained practically the same. In other words, he had reduced the cost of producing each unit of crop—the important economic factor in our farming operations, for it determines, largely, the net profit of the farm.

I have chosen to present this illustration of the growing belief in the necessity of adding commercial plant food to the soil, because it is typical of thousands of other cases in the state. Subsequent to the World War we did our major experimenting in the use of limestone. A car load of perhaps 40 tons was distributed to 10 or 15 farmers. We saw good results. The practice grew slowly at first, but it took root. Within the short space of 10 years, liming has become a general practice and in the majority of the counties limestone is now being shipped in, not only in car loads, but frequently in train loads through the cooperation of railroad officials.

Now we are turning our attention to the use of fertilizers. It was my privilege recently to pass through Buchanan county and I was amazed to learn from county agent Walters that in this strictly agricultural section over 24 car loads of commercial fertilizer had already been shipped in during 1928. And with what results was fertilizer used here? On the Chas. Mythaler farm superphosphate had increased the crop of oats by 10 bushels per acre. On corn its use increased the yield some, but it hastened the maturity by from seven to ten days. The corn so treated weighed out better, fed better, and kept better in the crib. This spring the story of the untreated portion of the cornfield was told in the unmistakable language of a strip of immature, mouldy, and rotten corn through the center of the crib, for by mistake that corn had gone into this crib last fall.

Did the phosphate pay? Let the corn answer. Unless the untreated

Barren sandy soil treated with limestone, phosphorus, and potash yielded over two tons per acre for the first cutting.

corn—the rotten strip in the crib—is removed it will spoil the entire crib. This year Mythaler ordered three tons of fertilizer. The larger part of this was a 2-12-2, for he has found that on his lighter soil the addition of both nitrogen and potash has paid. And all around him his neighbors, Troy brothers, Julius Cappel, C. E. Turner, Frances Schinka, Jake Arnold, and several others, have had a similar experience. Phosphate they used at first, but they think now that the complete fertilizer pays them best.

Soils Vary

These experiences are typical of other sections of the county. The soil varies all the way from a sandy clay loam to a mixture of sand and peat, and consequently different fertilizer mixtures have been used. On the Chris Emerson farm an 0-8-24 has given good results. The soil here is a sandy peat. Prior to the time that fertilizer was applied grain crops could not be grown. Two hundred pounds of fertilizer were responsible for a 40-bushel yield of sound corn. It is true that such cases are the exception to the general run of farms of the county, but the use of complete fertilizers over the entire county for the average farm has been so good that county agent Walters is recommending a 2-12-4 mixture for general use. This does not mean that the farms are worn out or that the soils here are infertile. That is decidedly not the case. But this does indicate the trend of public opinion with reference to the use of fertilizers.

What do we find when we shift the scene of this inquiry to the state? Figures from demonstration plots show definite and conclusive results favoring the use of some kind of fertilizer, the kind depending, of course, largely upon the nature of the soil. On the other hand the increasing demand on the part of farmers for either simple or complete fertilizers indicates that we are launching out on a major project of soil improvement that seems to be quite general in the Central West. No doubt phosphorus will be used first, and perhaps most extensively. It is in most of our soils the most limiting element, and further than that, our experiments and demonstrations have been conducted primarily with reference to it. Our greatest trouble is that we do not have enough experiments and the result is, as our soil authorities admit, that the use of fertilizers is proceeding much faster than our available information.

"Necessity is the mother of invention." This is literally true when applied to the use of artificial plant food. We are trying to find a way out of the economic depression in which we find ourselves. Unable to get a decent profit at the prices which now obtain, we are attempting to reduce the cost of production per acre or per unit, which ultimately is one of the important items as a measure of the efficiency and permanency of any business. The individual farm is no exception to this rule.

Apply Rule to Crops

As farmers we have applied this rule to our livestock. We tested out the cows and sold the poor producers. But we have not until recently applied it to our farms in this section; if our plants suffered from malnutrition, we simply footed the bills. If we bought a worn-out, low-producing farm, a farm from which perhaps all the crops and grain had been sold for a number of years, we attempted and often did bring it back to profitable production by returning to the land in the shape of barnyard manure the products which it had grown. It can be done, especially if we can buy and feed on our own farm the fertility in grain and feed that somebody else is willing to sell to us. By this process we can wait, if we are so situated financially to do so, until our farm becomes profitable. At the same time our neighbor loses what we gain.

When our land was newer and more

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Which Wheats Are Best?

By C. B. Sherman

U. S. Department of Agriculture

"UNCLE SAM has a mill down in Washington where he produces flour, makes bread, and tells farmer, miller, baker, and consumer how each may get the most for his money invested in wheat, anywhere from the seed to the loaf." So ran a headline in a New York paper in telling of the experimental milling and baking investigations of the Department of Agriculture.

The Department might not make quite such sweeping claims for the work, but it does believe that the results are extremely practical and that their benefits extend back to the farmer, and on through the millers and bakers and other handlers, and to the actual consumers. And it is a fact that if the best uses are made of these results, thousands upon thousands of dollars can be saved all along this route from farmer to housekeeper.

To get just the desired conditions for these studies, the Department of Agriculture equipped its own small experimental mill and a complete testing laboratory used for preliminary testing of samples of wheat and for making practical baking and quality tests of the flour manufactured in the experimental mill. Some of the apparatus in this laboratory was especially developed by the chemists in charge for these milling and baking investigations.

For the Farmers

The phase of the work which is of especial use to the farmers is the determining of the exact relative values of different varieties of wheat. "Before a new variety of wheat is distributed," say the investigators, "some agency should ascertain if it meets the demand of the market, or it will not be desirable either to the farmer or to the miller. It is not enough to introduce a new variety of wheat that yields more than the variety the farmer is growing. The new variety must be of such quality that the farmer will receive a higher total price for his wheat. Therefore, the plant breeder and the market specialist must work together to see that only those varieties are distributed that are at least as good as the varieties now generally grown."

A section of Uncle Sam's experimental mill.

As a result of this getting together of plant breeders and market specialists it has been possible to issue definite recommendations for the discontinuance of the production of certain varieties of poor quality wheat and increasing the production of varieties of good quality. Then, several varieties that were recently introduced or developed by breeding have not been distributed for commercial growing, because these experiments showed them to be undesirable on the whole. On the other hand, the production of several other varieties has been rapidly increased after it was determined by checked experiments that they possessed good milling and bread-making qualities.

Inherent qualities of a variety are found to be basic and are usually the principal factors in the milling and baking value of any sample or lot of wheat. Varietal differences have been found to be more important than effects of season, locality, rainfall, elevation, and soil. So the little experimental mill is of great help to the farmers in determining the best varieties to grow.

For Buyers and Millers

When identification is possible, the determinations are useful to the wheat buyer and miller in selecting and blending wheats to meet particular milling and bread-making requirements.

Tests must be made from many points of view. Milling yield and the color of the flour or bread are significant factors in "milling quality," and there are other considerations such as the "strength" of the flour, and its capacity to absorb water. The result of one kind of test is of practical value only when considered together with the results of the other tests.

Although not in all ways comparable with commercial milling, experimental milling gives results which indicate the relative milling value of the different wheats as definitely as do tests made in a commercial mill. It is a well-known fact, that different commercial mills that are milling the same kind of wheat, or different operators at the same mill, or even the same operator milling in the same mill at different times, will get results at different times that vary considerably. Tests made in the experimental mill by standardized methods show less variation in milling yield and in baking quality of flour than some of the variations observed in commercial mills.

For the Housekeeper

Results for use in the household in everyday life are secured through the cooperation of the Bureau of Home Economics. Methods and formulas for getting the best results in baking bread from the various commercial types of flour are now found in the retail markets—methods primarily for the use of the housewife—are being determined. Types chosen for study are representative, such as a Minnesota hard red spring wheat flour, a Kansas hard winter wheat flour, a Pennsylvania soft red winter wheat flour, and an Oregon white wheat flour.

Announced Results

As a result of extensive experiments with American wheat varieties extending through several years the Department has now announced results in terms that are understandable by every farmer and miller. "Marquis is the best variety of hard red spring wheat in milling and baking quality. It is also the most productive variety, except in northwestern North Dakota, and northeastern Montana, where it is slightly outyielded by Red Fife and during the frequent seasons in which rust occurs in North and South Dakota when it is outyielded by the Kota variety. With these exceptions, Marquis should replace all other varieties of hard red spring wheat in the northern spring regions," says the report.

"Prelude, Pioneer, Ruby, and Kota are only slightly inferior to Marquis in quality and only slightly superior to Kitchener, Red Fife, Glyndon,

Haynes Bluestem, Power, and Preston.

"Kubanka excels all other varieties of durum wheat in baking quality, followed by Kubanka No. 8, Kubanka No. 98 (Nodak), Arnautka, and Peliss. Pentad, Buford, and Mindum are of poor baking quality. Baking quality, however, is not necessarily a measure of the macaroni value of durum wheats. Kubanka is the most generally adapted variety of durum wheat in North and South Dakota, but during most seasons of severe rust, it is considerably outyielded by Acma and Monad. In Minnesota, Mindum is more productive than Kubanka, while in Montana, Wyoming, and Colorado, Peliss is the most productive durum wheat.

"The three leading varieties of hard red winter wheat—Turkey, Kharkof, and Kanred—are practically equal in milling and baking value. All of the varieties of hard red winter wheat are satisfactory for milling and bread making, although Blackhull, Minturki, and Alton are softer wheats and in some respects somewhat inferior to the others.

"Kanred is the most productive wheat in the central hard red winter wheat region, but outside of this region Turkey and Kharkof, or selections from them, yield about as well. Minturki is the highest yielding winter wheat in Minnesota. Blackhull yields nearly as well as Kanred in central Kansas.

The Soft Wheats

"The Red Rock variety has the highest bread-making qualities of the soft red winter wheats. Other good varieties are Purplestraw, Minhardi, Odessa, Fulcaster, Fultz, and Buffum No. 17. The poorest varieties in quality are Red Russian, Jones Fife, and Hybrid 123.

"Bobs, Hard Federation, White Federation, Federation, and Galgalos are among the best of the white wheats for bread-making. Baart, Dicklow, and Pacific Bluestem are of good milling and baking quality, while Goldcoin and the club wheats, Hybrid 128, and Little Club are low in bread-making qualities.

"Baart is the most productive spring wheat in the dry sections of Washington, and is well adapted to central and eastern Oregon and drier sections of California. Hard Federation outyields Baart on the dry lands in Oregon. Federation and Dicklow are the most productive wheats on the irrigated lands in Idaho and Oregon. Hybrid 128, a winter variety of club wheat, is the most productive wheat in the subhumid sections of southeastern Washington and northeastern Oregon.

Compare Classes

"Comparison of the milling and baking qualities of the various classes of wheat shows hard red spring to have averaged lowest in test weight per bushel of dockage-free wheat, and in yield of "straight" flour, and highest in volume of loaf, while in yield of bran it was one of the two classes showing the highest percentages. It also averaged high in protein content and yield of shorts.

"Durum wheat showed the highest average results in test weight per bushel of dockage-free wheat, protein content, yield of shorts, water absorption of flour, weight of loaf, and ash content of flour. This class averaged lowest in yield of bran and in color score of bread and was low in yield of flour.

"Hard red winter wheat averaged highest in yield of flour, and in color and texture of bread, and second highest in test weight per bushel, yield of bran, water absorption of flour, and weight of loaf. It averaged lowest in yield of shorts.

"Soft red winter was one of the two classes averaging highest in yield of bran. It averaged second highest in yield of flour. It averaged lowest in crude protein of wheat and in water absorption of flour, and second lowest in yield of shorts, and in weight, color,

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Certified Potato Seed

By M. R. Ensign

Florida Experiment Station

IT may seem somewhat trite to write upon potato seed certification. Those quite sophisticated ones in seed potato lore will likely deem or dub it but "another case," but those who have been prone to look upon seed certification as a guaranteed standard of excellence may find their complacency rather rudely upset.

The discovery was quite accidental. The outcome was never in doubt after the first look. It happened this way.

The time for planting the last lot of seed in a "time of planting" test arrived. In order to plant the buffer row it was necessary to secure another bag of seed. This was secured through the local potato growers' association at Hastings, Florida. All of the seed used in the test rows were certified Maine grown seed of the Spaulding Rose variety and purchased through the above agency. The regular lot of seed and the extra bag of seed were planted in adjacent rows on February 14 at La Crosse, Florida. They were given identical cultural treatment and the seed pieces in the two lots very closely approximated each other in average weight.

The rows were 560 feet long and these were divided into 10 blocks 50 feet in length. Each block was harvested separately where a record of total tubers, number of primes and seconds, together with the weight in grams was made. Blocks 3 and 7 were harvested so as to give individual hill records on 35 hills for each seed strain in each block. Harvesting was completed on May 20, 1928. From planting to harvest, therefore, a period of 96 days elapsed.

Comparative data regarding the yield from the two strains of certified seed, based upon 350 hills from each strain, show a computed difference of 24.22 barrels of primes between strains I and II. There were 7.84 barrels more of No. 2's and 2.38 barrels more of culls in strain II than strain I. At an average price of five dollars per barrel for primes the increased yield from strain I would return $121.20 more per acre.

Marked Differences

The largest and most significant difference was noted in the number of primes per hill and the computed yield for each strain on an acreage basis. This computation was based on a 67 per cent stand for each. As a matter of fact there were fewer missing hills in strain I. The increased number of barrels of No. 2's and culls in strain II was significant.

The inherent difference between these two strains was noticeable from the time they began to appear above ground. The growth of strain I was much more uniform and rapid than II. The former, also, had a much darker color which was maintained longer. The vines in strain II assumed a more upright bristly appearance and produced an abundance of bloom in contrast to I. Normally, the Spaulding Rose variety produces little or no bloom in this part of Florida.

No doubt some of the characteristic quantitative and described differences are to be explained by the percentage and relative severity of rhizoctonia in the two strains. In strain I an aver-

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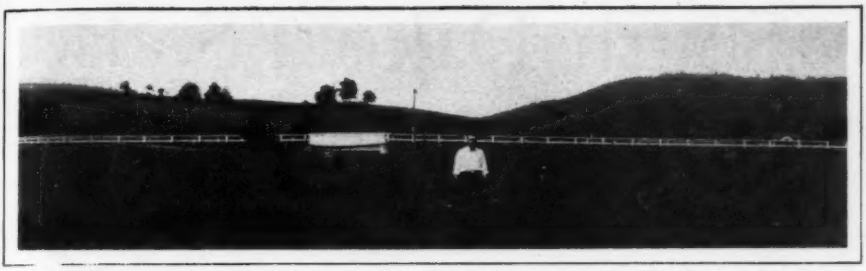

Complete fertilizer increased the yield of this timothy and clover meadow more than one ton.

FERTILIZER Turns *the* Trick

By
Sam D. Preston

County Agent, Flint Hill, Va

An application of 300 lbs. of a 4-16-4 fertilizer produced the largest yield of wheat in the community.

UP until very recently here in Rappahannock county, Virginia, fertilizer was fertilizer, and most of it was 16 per cent superphosphate alone, or as a great many farmers knew it, just 16 per cent.

Last spring meetings were held all over the county for the purpose of discussing fertilizers from a standpoint of plant foods, or plant rations, and to make the farmer see, if possible, that there is just as much art in feeding plants as there is in properly balancing a ration for a hog or dairy cow. The extension specialist was present, and we held what we called barn meetings, meeting at the barn of one farmer in each community. Aside from a part of the week, which was rainy we had the best attendance and more enthusiasm than at any meetings held in the county during the past four years.

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South Dakota Soils

By George L. Winright

County Agent, Salem, S. D.

SOIL maintenance is not a popular subject in this section. Few people take any thought of soil fertility until it is depleted and then it is always a question of "getting it back." The same principle holds good with soil as with any other property—that it is easier and cheaper to keep it in condition than to rebuild or move.

The soil survey for the counties in South Dakota which have been completed show some very interesting facts, and it is further interesting to note that the findings of the survey compare favorably with the records of yields in early days. The analysis of the farm lands in McCook county compared to the virgin soil or native prairie along the roadside shows a decrease of approximately 20 per cent in the nitrogen content and very little of this land has been farmed for more than 30 years.

In the Old Days

Old-time farmers agree that they could raise much larger crops under similar moisture conditions in the early days than is possible at the present time, but they never question the condition of the soil. In fact, most of them are retired and seem to take a certain degree of pride in the fact that the young farmers can not come up to what they were able to do when they were on the farm.

The records show that in 1889 there were $300 spent for fertilizers in this country. In 1909 only $205 worth was purchased, and in 1920 there is no record of any being used. During the same period, the assessed value of land increased from $16.38 per acre to $160.13 per acre. General development was in proportion and this great development seems to be sufficient reason to cause many people to think that their land is different from land in many other places and that it will never wear out. But the history of many places in other states proves that the same condition has prevailed there, and that the soil was neglected until worn out, and other property decreased with the decreased fertility of the soil.

The writer was at one time on a cotton farm in one of the poorer sections of Alabama for a period of six years and had a chance to observe the final results of a system of farming which took from the land but put nothing back until the land had been ruined. The fertilizer problem was a very serious one at the time mentioned. "As the land is so are the people," and both land and people were so poor that it was impossible to buy more than enough fertilizer to run one year at a time. So they lived from one year to the next on land that had at one time been very productive and very valuable, as some of the older inhabitants could remember and as the ruins of many wonderful sets of improvements also bore evidence.

It was possible for the land to be brought back. A Chicago manufacturer demonstrated this thoroughly on one particular farm, but it was not possible for the farmers to develop the land and live at the same time, and for that reason those who really needed

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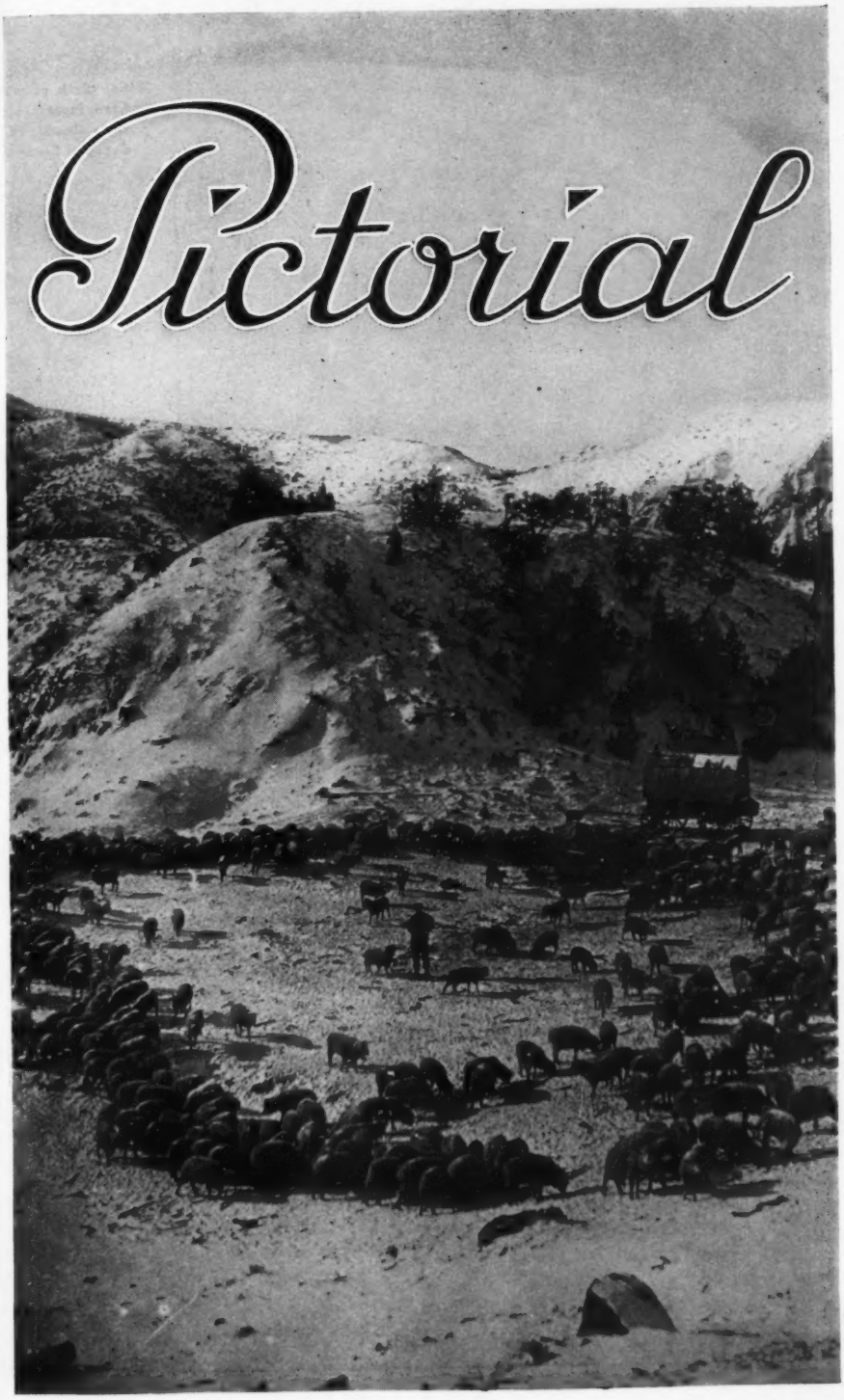
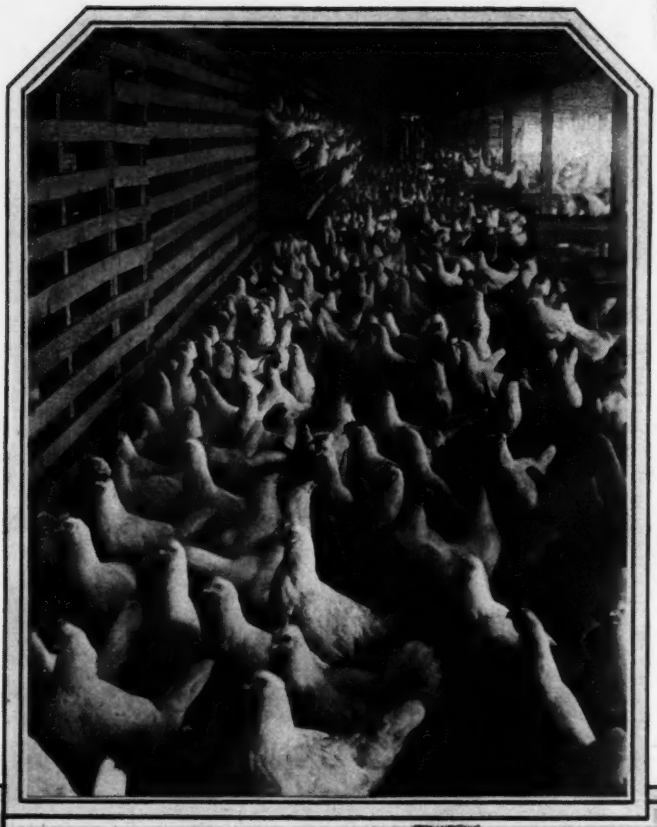
Pictorial





A fine flock of white leghorn layers in the poultry house of a Georgia farmer.

An old water power-mill at Anderson, S. C. It will shell and grind corn, gin cotton, grind wheat, and it also operates a sawmill and planing mill.

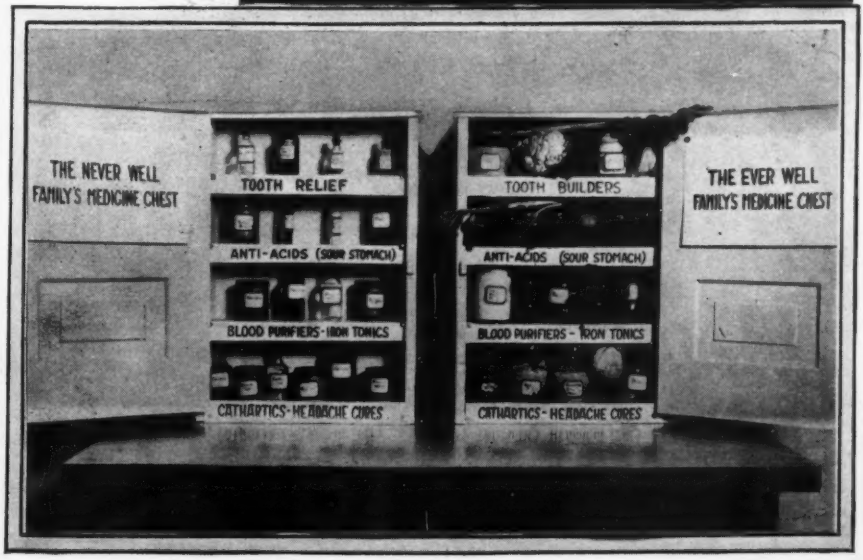
Hanging up tobacco leaves to dry inside the tobacco barn of L. C. Weaver of Moultrie, Georgia.

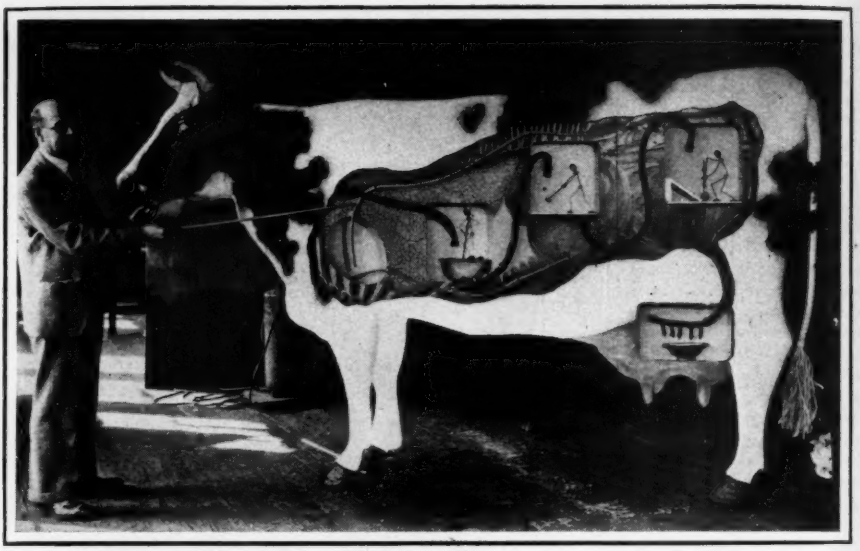
Below: Delbert Swindell of Alexandria, Indiana, with his world's record team weighing 2,390 pounds, exerting a tractive pull of 2,600 pounds at the 1928 Indiana State Fair. The near mare is a three-year-old and the team is used regularly for farm work.

Dr. H. W. Mumford resumes direction of the Illinois College of Agriculture, after a three months' leave of absence spent as one of ten Americans on a commission which made a study of German agriculture for the agricultural, banking and industrial interests of that country. He is shown examining the season's corn crop on America's oldest soil experiment plots, the Morrow plots at the Illinois agricultural college.

Below: Dr. E. W. Brandes, Bureau of Plant Industry, U. S. D. A., has just returned from New Guinea, where the tropical wilderness was searched for new sugar cane plants that might prove more resistant to disease than the sugar cane now being grown in this part of the world. He is shown planting some of the canes which he brought back with him.

Miss Lucy J. Folsom, Home Demonstration Agent, Madison County, Ohio, has an ambition to aid in the development of the master cook, along with master farmers and master home-makers. In line with this plan, Miss Folsom has devised a most clever and unique medicine cabinet, really two cabinets, to concretely demonstrate the right and the wrong way to live in so far as the family health is concerned. She has termed the two chests the "Ever Well" and the "Never Well Family Chests." The "Ever Well" cabinet has a shelf for tooth building foods, making a sharp contrast with the "Never Well" family's shelf of medicines for toothache relief. The lemons, oranges, apples, celery, spinach and other good foods in the one chest, place in the background the soda mints and charcoal tablets for sour stomach cures in the "Never Well" cabinet. Miss Folsom desires to interest the people of Madison county in what foods are most proper to cook, those which will aid in general health and not detract.





The mechanical cow which was exhibited by the U. S. Department of Agriculture at the National Dairy Show at Memphis, October 13-20. The side is cut away so as to illustrate by various contraptions the important processes that go on in the transformation of feed into milk. The cow is equipped with a phonograph and records which make it possible for her to tell the dairyman what he ought to do to make milk production profitable.

Mr. Henry Davis, of Barnesfield, England, with his team of horses with which he won the ploughing championship of England. He is shown holding the cup awarded him by the Middlesex Agricultural Society which conducted the contest. Davis has won the title nine times, taking it the last three years in succession.

The Editors Talk

"In Everything Give Thanks"

Thanksgiving is a day for inventory. It is a time for stock taking. We tabulate the blessings that have come to us and instinctively lift our hearts, if not in audible words at least in silent gratitude, to the Giver of All Good.

But in this process of stock taking it is inevitable that many of us find the year has not been one of unalloyed and unmitigated blessings. There have been times when it has been exceedingly difficult—if not impossible—for us to sing the Doxology. Adversity has come to many of us—loved ones have departed from us—ill winds have blown upon us—sickness has laid some of us low.

The fortitude with which we meet the calamities of life is the yard stick of our characters. The calamities through which we pass are like the refiners' fire—burning out the dross and leaving the pure gold of character.

The Apostle Paul remarks, "I have learned no matter what my state in life, therewith to be content." It was no doubt a bitter lesson, but having *learned* it, he was content. And no matter what our trials—our sorrows—some one has had to travel that same road before, and if out of all the travail of adversity we can learn the lesson of contentment, we can still lift our hearts in gratitude to Him who doeth all things well.

And to those of us who have prospered, who have escaped during the year the deep, dark waters and upon whom have been showered in rich measure the blessings of life, "Unto whom much has been given, of him shall much be required." To such of us comes the clarion call to dedicate our talents, our time, our money in consecration to the service of our fellows in every land and every clime. Thus can we manifest in tangible form our gratitude for the bounties that have been bestowed upon us, and carry forward in person in the program of Him who once said—

"IN EVERYTHING GIVE THANKS."

Supply and Price

No matter where scientific effort starts, if it is to be of any great benefit to the practically minded people of today, it ends up with a price or cost relationship.

Our standard of living, our prosperity, wealth, social stability, much of our happiness, our modern achievements in transportation and communication depend largely on the relationship of different prices, and the relationship of such prices to supply and demand.

The relationship is the vital matter. It is in this field of relationship that economic research has done much of its best work and made the greatest prog-

ress in the last generation. But it is just this concept of relationship that is not yet fully appreciated.

Most of us like to think of one thing at a time. We have good single track minds, but a relationship means thinking of two things—that is different. Overproduction as a cause of agricultural depression is single—easy to comprehend—but when it is said that the most serious single factor in causing the agricultural depression is "the maladjustment between farm and retail prices," this denotes two things and a relationship—which is more troublesome.

And yet little progress can be made in achieving agricultural prosperity unless the problems are examined from the point of view of interrelationships. For this reason a recent publication by Warren and Pearson of Cornell University on the "Interrelationships of Supply and Price," are particularly valuable for any one who wants to put any serious thought on the causes of agricultural depression. The effect of supply on prices has been fully studied in this bulletin, No. 466.

It is pointed out that the maladjustment between farm and retail prices has been caused largely by increased costs of distribution and handling. For instance, in May, 1927, food sold by farmers was selling at 72 per cent above prewar prices, but farmers were receiving only 46 per cent above prewar. Distributing charges averaged 91 per cent above prewar. This makes farm prices low. The agricultural depression is therefore primarily due to high handling charges due to deflation.

The law of supply and demand will eventually remedy this situation, but in the agricultural world it works much slower than in the industrial world. Before agriculture is again prosperous, several relationships of prices, costs, and production will go through a slow but certain change—apparently the general trend of such changes can be foretold.

One thing seems fairly certain—depression is not the result of a single isolated cause. It is the result of maladjustment in price relationships. If we quit looking for such a single isolated cause, at least some progress will be made.

Waste Products

If the chemist were a magician instead of a patient scientist the farmer would soon find himself in possession of good markets for the 10,000,000 tons of waste products, so-called, that are incidental to the production of such crops as corn, wheat, oats, cotton, sugar, soybeans, and peanuts. Dr. Henry G. Knight, Chief of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, says that in order to make use economically of the great volume of farm by-products which are now farm wastes, the chemists believe it essential that long continued research be carried on to reveal the chemistry of the carbohydrates, the celluloses, the pentosans, and lignin. "The chemist," says Dr. Knight, "looks upon the products of agriculture as the raw materials to be worked up by industry to obtain their hidden values which, in turn, would decrease present wastes and relieve the farmer to some extent by widening the market and stabilizing the demand for his products. For example, sugar-cane bagasse, which ordinarily is useful only as fuel, is worked up by industry into wallboard and other products. Corn is worked up into starch, commercial

corn sugar, corn oil, etc., and by fermentation the corn sugar is converted into butynol, acetone, and grain alcohol which may be put to many commercial uses."

In a recent issue of BETTER CROPS WITH PLANT FOOD we published an article showing almost undreamed of uses to which corncobs, formerly considered purely a waste product on farms, could be put. With the aid of chemical research wheat straw is being made into a paper board of great structural strength and fireproof quality. Many products have been made from cottonseed, from unsalable fruit, and new uses are being found for milk solids heretofore counted as waste.

The field was never better for the young man with an agricultural inclination who does not wish to actually farm. Scientific research is making tremendous strides and in providing new uses for farm products will do more to relieve the farmer than all of the legislation that can be passed.

As Ben Franklin would say today, "He who by the plow would thrive, must have a chemist hold or drive."

Supplant or Supplement Which?

Automobiles have supplanted the buggy—wireless has supplemented the cable. Street cars propelled by electricity have supplanted horse-drawn cars, but as a medium for disseminating political discussion the radio has supplemented all other means of the written and spoken word. And strange as it may seem, the more the radio is used to carry the political speech into the home, the greater the demand for speakers and the newspaper to read all about it.

In this age of new things and new ideas—does the new supplant or supplement the old? If progress is to be made in the application of scientific research to human activities then more than ever is it necessary to distinguish between supplement and supplant.

Much useless opposition, much friction and confusion may arise, simply because of the latent fear of vested power and authority that the new may supplant the old established order.

There are several fields in agricultural endeavor where the distinction needs to be more sharply drawn. Two such instances are shorter methods for the determination of the fertilizer requirements of our major soils and crops and the other closely akin is the concept of ratios in stating plant food requirements.

Both can only supplement what has gone before, and in supplementing pioneer work, they add an interest and vitality in the agronomic field that in turn must stimulate further achievement.

There is a great practical need for shorter methods than the use of field plots as a guide to the profitable use of fertilizers. There is a great need for a simple basis of fertilizer analysis that will coordinate and profitably distribute experimental work. But faulty as some of the results from some experimental plots are, leading international opinion agrees that field experimental plots in some form must continue.

Shorter methods for determining soil fertility needs supplement such plots, but do not supplant them. With thousands of soil types on which no fertilizer work has been done, such short methods as are being developed are needed as an

aid to judgment. There are urgent uses for both plots and shorter methods, each adds to the value of the other.

As in many other cases of modern developments, shorter methods of determining plant food requirements and the ratio concept, properly used to supplement other work, will add a vitality and interest that cannot be gained by the most determined sort of opposition.

The Weather in Verse

Remember your old weather rhymes—they may help you decide what to do today. According to Dr. W. J. Humphreys, senior meteorologist of the Weather Bureau, U. S. D. A., they have a value.

Almanacs and other long range predictions on the weather are not reliable. Intelligent farmers nowadays should pin their faith on official reports by radio and on their own observations. Scientific forecasting of the weather does not place any value on many of the old signs, particularly those that are supposed to forecast one season from occurrences in the previous season. However, Dr. Humphreys believes that many of the sayings in regard to the weather that have been handed down from generation to generation are based on many observations and are often reliable. For example, he believes that a warning of some value is:

A rainbow in the morning
Is the shepherd's warning;
A rainbow at night
Is the shepherd's delight.

Another good guess is:

If the sun sets in gray
The next will be a rainy day.

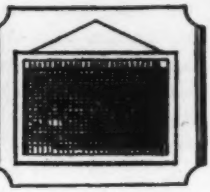
According to Dr. Humphreys, one of the best indicators for the weather for the day is the state of the dew in the morning. Dew gathers on grass and other exposed objects when they are cool enough to condense it out of the air, just as moisture is condensed out of the air on the side of the pitcher when filled with ice water. Grass and other outdoor things cool considerably only on still, clear nights, the kind that occur during a spell of fine weather and at no other time. Hence a heavy dew means that the air was still and the sky clear, at least during the latter half of the night. It is probable that if there was neither wind nor clouds during that time the day will be a good one for all outside work. On the other hand, if there is no dew in the morning, it is almost certain that either the sky was clouded or that there was an appreciable wind or both; and both, as a rule, precede a general rainstorm by 6 to 12 or even 24 hours, according to circumstances.

When the grass is dry at morning light,
Look for rain before the night;

When the dew is on the grass
Rain will never come to pass.

Dr. Humphreys believes there is sound reason for these two proverbs.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

LEARNING FROM THE HOOSIERS

Early this fall a group of Illinois chicken raisers, under the leadership of men from the Illinois College of Agriculture, made a tour of seven Indiana commercial poultry farms. The poultry extension specialist of the college, H. H. Alp, reported a number of practices that could be adopted with benefit by many of the farm flock owners of his own State. Among the practices which distinguish these successful poultry farms are: Strict sanitation, including keeping the birds off dropping boards during the day; liberal grain feeding; plenty of fresh drinking water and means of preventing freezing; feeding a home-mixed mash; houses of shed-roof type and 20 feet deep, equipped with board or cement floors; planer shavings for nesting material. These successful commercial poultrymen did not favor the strictly all-mash method of feeding layers, most of them believing in grain feeding at times.

WATCHING SOIL BACTERIA

A method of watching soil bacteria under the microscope, which may some day be of practical value to the farmer, has been developed by Dr. H. J. Conn, bacteriologist at the New York State Agricultural Experiment Station. His discovery is considered by French, Italian, and German investigators as an important addition to the equipment for the study of soil science. This method of watching the soil bacteria in their natural surroundings is one more step ahead in the determination of which soil organisms are beneficial and which are harmful.

Another scientist at the same station, Dr. R. S. Breed, not long ago developed a method for studying milk bacteria under the microscope. By the microscopic method it is possible to determine rather quickly whether or not an organism when inoculated into the soil will grow there. This is an opening wedge which should give scientists and farmers some surprises and no doubt new means of meeting old problems.

BARLEY IN TROUBLE

In recent months scabby barley has given that dependable grain somewhat of a black eye. At least that is the case in some places where considerable scabby barley has been fed to hogs. Not so long ago reports came from Germany that some hog feeders had had trouble with imported scabby barley and now the question is being discussed in various sections of this country. Barley affected with scab is not new but the disease has reappeared in the Midwest and is common in the Corn Belt this season. The University of Wisconsin has recommended that farmers in that State before buying large quantities of barley run a week's feed test to see if it will make pigs sick. The College of Agriculture is also offering to test samples. J. D. Dixon, plant pathologist at the College, says the disease is undoubtedly caused by a scab which seems to damage barley every five or six years. He says that it is spread

by a parasite that lives over the winter in old corn-stalks and grain straw and that good plowing which turns under stalks and straw will cut down the damage greatly. The animal husbandmen at the station are making experiments in feeding scabby barley with the hope that it can be made palatable and harmless when fed in any amount to pigs and other livestock. Tests made in Indiana have shown that pigs can be fed safely on a ration of 1/3 scabby barley, 1/3 corn, 1/3 oats, and 10 per cent tankage.

DUST STOPS SMUT

Smuttox, a formaldehyde dust, originated by the Department of Botany and Plant Pathology of the Ohio Agricultural Experiment Station, Wooster, Ohio, has been found successful in preventing oat smut. Check plots averaged 8.8 per cent smut infestation, whereas the plots that were treated with the dust averaged only .136 per cent. Twelve of the treated plots were completely free from smut. Those plots on which the oats had been given the old formaldehyde treatment showed very good control results, the average infestation being .92 per cent. The patent rights to this formaldehyde dust were turned over by the State to a commercial concern which is now making it.

FAVORS CALCIUM ARSENATE

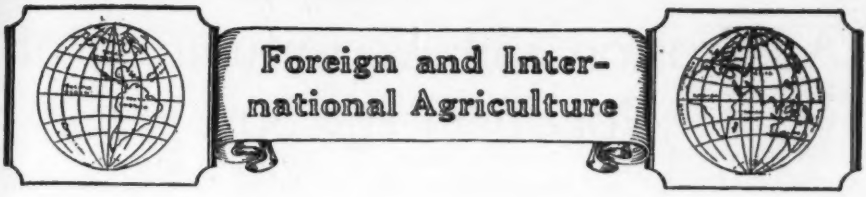
In the early days of spraying fruit trees, faulty calcium arsenate did much damage by burning the fruit, but at the present time, according to the results of six years of careful experiment at the New Hampshire Agricultural Experiment Station, this chemical is so made that there is no reason for prejudice against it. For a long time arsenate of lead excluded the calcium arsenate in spraying for apple scab, even though arsenate of lead caused some injury. The final conclusion of the experimenters is that lime sulphur and arsenate of lead controlled scab but caused russetting of fruit, while lime sulphur and calcium arsenate effect the same control without causing this damage.

PIGS USE COPPER

Copper sulphate, commonly known for its poisonous property, has been found by investigators at Iowa State College to be beneficial to pigs when fed in small quantities. Pigs were given rations complete in proteins, vitamins, energy producing and inorganic substances—in fact the best kind of ration according to modern feeding practices—and yet the addition of small quantities of copper sulphate increased weight and growth. The animals seemed to make better use of their feed when they had the copper along with it. Some rats that were fed copper sulphate along with their rations were killed, and it was found that most of the copper had been stored away in the liver. Scientists venture the suggestion that this fact may have a bearing on the value of liver in the treatment of certain human ailments. Tests similar to these Iowa investigations have been carried on at Wisconsin where it was found that copper is closely associated with the assimilation of iron in the body.

CORELESS CARROT WANTED

Because the consumer demands a coreless carrot, horticulturists of the University of Minnesota, gardeners, and seedsmen got together recently to provide just this kind of a carrot. It is thought that by careful and persistent efforts a uniform strain of a desirable root can be developed in a few years and the University vegetable experts are going at the job. At the same time they are undertaking to improve the Table Queen squash (also called the Des Moines or Acorn) which has too many colors and is not uniform enough.



Lime *and* Fertilizers

By A. Lancaster Smith

Sidmouth, England

A TOPIC which should receive considerable attention at the present time is the value of lime and artificial manures* when used in conjunction. It has been estimated by such a well-known authority as Sir A. D. Hall that one of the most important factors affecting crop production is the question of liming. He said,

"What does the farmer want to find out about his soil? First of all the analyst can be asked whether it is short of lime or not. Sometimes the analyst is not needed because the land is so sour and so short of lime that the weeds bear witness. The presence of much spurrey (Spergula arvensis) or corn marigold (Chrysanthemum segetum) or sheep's sorrel (Rumex acetosella) is a sure indication of the need of lime, as is again an abundance of foxgloves in the hedgerows. The analyst may be able to tell the farmer how much lime is neded to correct the sourness, and again whether to use quicklime or ground carbonate such as chalk or limestone."

In numerous cases it has been shown that artificial manures* do not produce the best results by reason of soil acidity. That fact was brought out quite clearly in the tests made at Rothamsted on hay during the years 1903-1906, and later tests on different types of soil lend weight to the contention that liming is frequently a necessity if fertilizers are to produce the best results. The following table shows the yields of hay harvested from the plots which were treated with an application of 2,000 lbs. per acre of ground quicklime at the commencement of the experiments.

Rothamsted Grass Plots

Year	Plot 7 Yield with mineral manures*, no nitrogen		Plot 9 Yield with mineral manures and nitrogen	
	Unlimed	Limed	Unlimed	Limed
	Cwt.	Cwt.	Cwt.	Cwt.
1903	49.5	51.9	50.1	60.5
1904	61.9	61.8	63.7	69.8
1905	44.3	47.2	36.9	52.2
1906.	34.4	41.4	39.0	50.0

The writer in Great Britain has urged in season and out of season the more extensive use of lime in conjunction with artificial fertilizers and there is sound reason for believing that in the long run those who ascertain if the soils on their holdings contain a sufficiency of lime, will be taking the first step to increase the better use of chemical fertilizers.

* Artificial or mineral manures are called fertilizers or commercial fertilizers in the United States.

Adsorption and Accumulation of Potash in the Soil

ACCORDING to observations made by M. Demolon, Director of the Research Station of Laon, France, on the soils of the Aisne, potash is fixed on organic matter through adsorption after the fashion of dyes used for woven material. It is substituted for lime in soils that contain enough of it, and for hydrogen in acid soils, but the substitution for hydrogen is much slower, and in M. Demolon's experiments the adsorbing capacity for potash in acid soils, has been doubled and even trebled by an application of lime or marl.

Potash fixed, or adsorbed by the soil is freed and put at the disposal of plants by lime.

M. Demolon draws the following practical conclusions from these observations:

First, lime and potash should not be applied at the same time, as it is sometimes recommended. The logical order of applications should include first an increase in the amount of removable lime in the soil in order to increase its adsorbing power, then an early application of potash. For such conditions the various soluble potash salts ought to be considered as equivalent.

The amount of potash applied should be proportionate to the adsorbing power of the soil. Those soils which retain potash most strongly, such as clay soils, have the greatest adsorption capacity. Heavy applications should then be the rule on these.

Attention should be given to this fixed potash and not on the potash in the rocks, the solubility of which in the soil, is much slower.

The following example is quite typical: clay extracted from some loams is particularly rich in potash since it analyzes about 3½ per cent. This analytical result sometimes brought the conclusion that potash fertilizers are useless in such soils, a statement which experience proved not to be true.

We have observed that this potash cannot be considered as adsorbed potash but as an element in the constitution of the clay with a much lower solubility. *(Journal d'Agriculture Pratique, Paris, France, 6/11/27.)*

Pasture Management in England

NEWER methods for the more efficient use of pastures are discussed by Sir A. D. Hall and J. W. Stewart in their article "Recent Developments in Grassland Management," (Journal of the Ministry of Agriculture, Vol. 35, No. 7, pp. 607-612, October, 1928).

The pasture is divided into several areas, about one acre for each 10 cows pastured, in each area. The animals are moved from one area to another about once a week, thus always affording them fresh pasturage, and allowing for recuperation of the pasture.

Lime is applied as needed and generous basic applications made of potash and superphosphate once a year (during the winter in England).

Top-dressings of nitrogen fertilizers are made just before spring growth begins and after each pasturage period. This system has been found not only to make a higher quality pasture but to allow the pastures to be used during a longer period of the year.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The need of asparagus plants for large amounts of potash and the ability of sodium salts sometimes to increase yields are clearly brought out by Professors B. L. Hartwell, J. D. Smith, and S. C. Damon, in Rhode Island Agricultural Experiment Station Bulletin 213 entitled "The Effect of Sodium Chloride and Carbonate on the Growth of Asparagus."

The experimental plots received varying proportions of muriates and carbonates of potash and soda, in addition to a standard application of nitrogen and phosphoric acid.

The largest application of muriate of potash was equivalent to 400 lbs. per acre, while that of muriate of soda was 3,895 lbs. The carbonates were applied in amounts equivalent to the potash and soda respectively in the muriates. Each treatment received a high and low amount of lime.

The authors found that in general there was an increase in yield for increasing the amounts of potash even when soda was applied in the largest quantities. When potash was applied in insufficient amounts, soda gave increases in yields, the chloride being better than the carbonate. Where the least potash and lime were applied, a great number of plants have died during the six years of the experiment, while comparatively few died where larger amounts of potash were used.

Muriate of potash tended to decrease soil acidity, and muriate of soda to increase it. Both carbonates decreased acidity.

It is planned to continue the experiment by replanting all plots and making larger applications of potash and soda.

While this bulletin is technical in character, the practical grower will find helpful ideas in it.

"A Study of the Effect of Commercial Fertilizers on the Performance of Apple Trees," Agr. Exp. Sta., Fayetteville, Ark., Bul. 227, June, 1928, J. R. Cooper.

Quarterly Bulletin, State Board of Agriculture, Dover, Del., Vol. 18, No. 2.

"Winter Killing of Young Alfalfa on the Fertilizer Test Plats at Athens," Ext. Div., State College of Agriculture, Athens, Ga., Vol. XVII, Cir. 148, Sept., 1928, Paul Tabor.

"Commercial Fertilizers," (State Control Report) Agr. Exp. Sta., Lafayette, Indiana, Cir. 155, June, 1928, H. R. Kraybill, O. S. Roberts, O. W. Ford, L. E. Horat, M. H. Thornton.

Soils

A summary of the results from all the experimental fields in various parts of the State away from the experiment station is given by Professors B. L. Hartwell and J. B. Smith, in Rhode Island Bulletin 214, entitled "Concerning Rhode Island Soils in Different Parts of the State." These results cover the period of 1893 to 1925.

Much of this work was concerned in the pioneer task of increasing the use of lime to correct the high acidity of the soils. On one interesting experiment when no lime was applied, corn responded to fertilizer materials in the following order: phosphorus, first; potash, second; and nitrogen, third. When lime was applied the

corn responded principally to potash, followed by phosphorus and nitrogen, showing that soil reaction influenced the efficiency of the fertilizer.

For spring wheat, potash was found to be very important. A low phosphorus content of turnips was found to indicate a need of the soil for that material.

This bulletin serves to give general ideas of soil needs on various soils of the State. Detailed reports can be found in the reference given.

"Soil Survey of the Sun River Irrigation Project," Agr. Exp. Sta., Bozeman, Mont., Bul. 207, Sept., 1927, William DeYoung.

Crops

The Florida Experiment Station in Bulletin 198, "Tobacco Culture in Florida," offers to the farmers of Florida an opportunity to grow better tobacco at bigger profits by proper use of fertilizers. Professor W. B. Tisdale, tobacco specialist, emphasizes in this bulletin the importance of an abundance of organic matter. Stable manure where obtainable is recommended and may be used in amounts around 10 to 15 tons per acre. Recommendations for use of commercial fertilizers are on the basis of amounts of each element to apply per acre as well as analyses that have the elements in the right proportion. Particular stress is given to sources of potash.

"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVII, No. 8, Aug., 1928.

"Flowering Bulb Culture in Florida," Agr. Ext. Div., Gainesville, Fla., Bul. 48, June, 1928, T. A. Brown.

"Report for the Fiscal Year Ending June 30, 1927," Agr. Exp. Sta., Gainesville, Fla.

"Annual Report of the President," State College of A. & M. Arts, Athens, Ga., Andrew M. Soule.

"Air-Cooled Apple Storages," Agr. Exp. Sta., Lafayette, Ind., Cir. 154, June, 1928, Clarence E. Baker.

"Fortieth Annual Report," Part I, Agr. Exp. Sta., Lexington, Ky., Thomas Cooper.

"A Comparison of Some Properties of Normal and Frosted Wheats," Agr. Exp. Sta., Bozeman, Mont., Bul. 204, Aug., 1927, Arnold H. Johnson and W. O. Whitcomb.

"The Relationship of Weather to Crops in the Plains Region of Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 206, Aug., 1927, P. Patton.

"Building a Program of Agriculture Extension," Agr. Ext. Serv., Raleigh, N. C., Ext. Cir. 169, Aug., 1928.

"Boys' and Girls' Club Work," Agr. Ext. Div., Fargo, N. D., Cir. 84, Sept., 1928, Harry E. Rilling and Pauline M. Reynolds.

"Akenes of Some Compositae," Agr. Exp. Sta., Fargo, N. D., Bul. 218, Apr., 1928, Anita Mary Blake.

"Fruit Varieties in Ohio, III, Damson Plums," Agr. Exp. Sta., Wooster, Ohio, Bul. 426, September, 1928, J. S. Shoemaker.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIII, No. 5, Whole No. 134, Sept./Oct., 1928, A. E. Perkins and C. F. Monroe.

"Field Crops for Pump Irrigation at Harney Branch Experiment Station, 1920 to 1927," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 236, June, 1928, Obil Shattuck and Roy E. Hutchison.

"An Analytical Study of the Putting Greens of Rhode Island Golf Courses," Agr. Exp. Sta., Kingston, R. I., Bul. 212, June, 1928, Basil E. Gilbert.

"A Chemical Study of Varieties of Cotton Seed," Agr. Exp. Sta., College Station, Tex., Bul., 374, Jan., 1928, M. T. Harrington.

"Varieties of Cotton for Central East Texas," Agr. Exp. Sta., College Station, Tex., Bul. 384, Sept., 1928, H. F. Morris and G. T. McNess.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 249 and 250, Sept. and Oct., 1928.

"The Relation of Season of Pruning Out Old Cuthbert Raspberry Canes to Amount of Winter Injury," Exp. Sta., Puyallup, Wash., No. 9-W New Series, July, 1928, H. D. Locklin.

"Propagation of Fruit Trees," Agr. Exp. Sta., Pullman, Wash., Pop. Bul. 141, June, 1928, C. L. Vincent and W. A. Luce.

"Cultural Experiments with Wheat for Grain and Forage Production," Agr. Exp. Sta., Pullman, Wash., Bul. 227, July, 1928, C. E. Hill.

"The Irrigation of Cotton," U. S. D. A., Washington, D. C., Tech. Bul. 72, May, 1928, James C. Marr and Robert G. Hemphill.

American Potato Journal, The Potato Assn. of America, East Lansing, Mich., Vol. V, No. 9, Sept., 1928.

Economics

"Oranges," Bul. 457, by H. R. Wellman and E. W. Braun, is one of the series of bulletins published by the California College of Agricultulture on California crops and prices. The aver-

age per capita consumption of oranges is 51. This is 46 per cent greater than prewar consumption. Even though there has been a marked increase in orange production, there is a relatively large acreage of young orchards still to come into bearing. Thus it seems probable that orange production will still continue to increase.

The data presented in Ohio bulletin 424, "Dairy and Other Livestock Production Costs in Medina County, Ohio," was obtained from a cost route in Medina county. This is in the dairy region of northeastern Ohio. The cost of producing milk on the various farms varied from $2.13 to $3.98 per hundred pounds with an average of $2.60. The average selling price was $2.67. Herds averaging less than 6,000 pounds of milk per cow produced milk at a cost of $3.08, and those averaging more than 9,000 pounds at a cost of $2.29 per hundred pounds.

With the increasing expenditures of the local, state, and federal governments, the tax problem becomes of greater interest. Ohio Bulletin 425, "Public Revenue in Ohio with Especial Reference to Rural Taxation," shows the sources of revenue collected in Ohio, and the expenditures of the same. Educational costs take about 40 per cent of the state and local revenue combined. Highways are second with a cost of 26 per cent of the total. These two services take nearly two-thirds of the revenue income.

"Farm Credit in a Plantation and an Upland Cotton District in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 228, June, 1928, B. M. Gile and A. N. Moore.

"Illinois Crop Reporter," U. S. D. A., Washington, D. C., Cir. 382, Sept. 1, 1928, Nils A. Olsen and S. J. Stanard.

"Markets for the Farm Products of the Billings Trade Area," Agr. Exp. Sta., Bozeman, Mont., Bul. 212, Jan., 1928, E. J. Bell., Jr.

"Marketing High Protein Wheat," Agr. Exp. Sta., Bozeman, Mont., Bul. 213, May, 1928, E. J. Bell, Jr.

"Services, Facilities, and Costs of Marketing Vegetables in the Lower Rio Grande Valley of Texas," Agr. Exp. Sta., College Station, Texas, Bul. 378, Mch., 1928, G. L. Crawford.

"Marketing American Cotton in England," U. S. D. A., Washington, D. C., Tech. Bul. 69, June, 1928, Alonzo B. Cox.

Diseases

"Sclerotinia Wilt of Sunflowers," Agr. Exp. Sta., Bozeman, Mont., Bul. 208, Sept., 1927.

"Factors in the Inception and Development of Fusarium Rot in Stored Potatoes," U. S. D. A., Washington, D. C., Tech. Bul. 62, May, 1928.

Insects

"Economic Poisons," Dept. of Agr., Sacramento, Cal., Spec. Pub. 88, Warren G. Marshall.

"Insects Attacking the Peach in the South and How to Control Them," U. S. D. A., Washington, D. C., Farmers' Bul. 1557, Oliver I. Snapp.

Connecticut Valley Tobacco

THE report of the Tobacco Station at Windsor, Connecticut, was recently issued by the Connecticut Agricultural Experiment Station (Bulletin 10). The report covers various important phases of tobacco investigational work, conducted by Messrs. P. J. Anderson, N. T. Nelson, and T. R. Swanback. Every tobacco grower would profit by reading and studying the results obtained in these important experiments.

The writers dwell on the "factors which influence the burn" of tobacco, mentioning the locality, the climate, the soil, the season, the method of handling, the cure, and fermentation. Either one or more than one of these factors may seriously influence the burning quality of tobacco.

In judging the burning quality of tobacco they take into consideration

the following points: fire-holding capacity, color of ash, closeness of burn, evenness of burn, flavor, aroma, and coherence of ash. The two methods used in testing the burn are termed "the strip test" and "the cigar test." These methods are carried out separately and then checked against each other.

In the nitrogen series, tobacco grown on soil treated with nitrate of soda in general shows a satisfactory burning quality.

In the phosphorous series, by the strip burn test, the heavier applications of phosphorus showed a depression in the fire holding capacity.

In the potash series, carbonate ranked first, nitrate and carbonate second, and sulfate third. A combination of the three carriers, however, gave almost as good results as the carbonate. These "strip burn tests" covering two crops are of sufficient interest to warrant a repetition of the two-year average, given in seconds:

Sulfate	40.0
Carbonate	46.9
2/3 Nitrate	
1/3 Carbonate	42.3
1/2 Carbonate	
1/2 Sulfate	40.2
1/3 Sulfate	
1/3 Carbonate	
1/3 Nitrate	44.1

The authors consider these differences to be small.

In another series where muriate is compared with sulfate as to burn, the muriate-grown tobacco is far behind, indicating that where the burn for example in cigars is important, tobacco should not be grown with muriate applied in large quantities.

Some very noticeable comparisons of the "strip burn test" and the "cigar burn" are that lime seemed to depress the burn in the first case, whereas in the cigar test the fire-holding capacity was good. Likewise urea did not affect the fire-holding capacity, but it did increase the whiteness of the ash. Large quantities of phosphorus lowered the fire-holding capacity in the strip test, but did not affect the cigar test. The writers seem to be of the opinion that the sulphur obtained by the application of certain fertilizing constituents, is detrimental to the burning quality of tobacco, but they are by no means certain on this point, and therefore they leave it for further consideration.

Why Fertilize?

(*From Page* 24)

productive than it is now, our fathers depended upon this "perpetual motion," unexhaustible fertility theory of farming to maintain crop production at a maximum point and, as they thought, indefinitely. Eighty per cent of our crops in Iowa—a comparatively high per cent in comparison with other states—is fed to livestock. At the very maximum we do not return to the soil more than 80 per cent of the crops which we do feed, in the shape of manure. In a ton of fresh mixed cattle and horse manure we returned —if we could save everything—about 10 pounds of nitrogen, 2 pounds of phosphorus, and 8 pounds of potassium, whether it needed these particular elements for plant production in just that particular proportion or not. Then we took from the soil in a 50-bushel crop of corn (stocks and grain) 74 pounds of nitrogen, 11.5 pounds of phosphorus, and 35.5

pounds of potassium; in a 50-bushel crop of oats (grain and straw) 52 pounds of nitrogen, 8.5 of phosphorus, and 39 of potassium; in two tons of clover hay 80 pounds of nitrogen, 10 of phosphorus, and 60 of potassium. The lime removed in these crops varied, in the corn and oats around 27 pounds to 146 in the clover.

Then it remained for the soil specialist and the county agent to tell us why we no longer grow spring wheat in the state; why clover stands are more frequently thin and winter-killing more common; why sweet clover refuses to grow in the field, but grows along the roadside; why certain rots and diseases attack our grain; and why our corn refuses to mature as it did in earlier days. On many of our run-down farms the cause of low crop yields needed no investigation nor explanation—it was self-evident.

Our most progressive farmers are taking the lead in correcting the conditions which our earlier, unbalanced methods of farming brought about. On the Chas. Mythaler farm at Independence, I saw fine sweet clover hay in the manger for the dairy herd. It was grown on land treated with limestone and a 2-12-2 commercial fertilizer. On the Chas. Robinson farm at Jesup, soils specialists marveled at the sweet clover crop that was grown with somewhat similar soil treatments, and they saw when this soil was put to corn increases of 20 to 30 bushels per acre over corn on adjoining land not similarly treated. The benefits are not alone of increased yield but also of better quality.

Commercial fertilizers either alone or in different combinations are used in many localities, successfully placing our farming operation upon a new and more profitable basis. Their use in many cases is that of a necessary supplement to our livestock farming; but with either livestock or without, we cannot well avoid the conclusion that we cannot remain in the business of farming without use of artificial plant food to help keep our cost of production down so that we may make a profit.

Paper Money

(*From Page 6*)

for use. Paper mulch also made it possible to double the yield of cotton at Arlington, Va., which is far north of the Cotton Belt.

Increases in yield, measured in some instances by total weight of the plant growth and in others by the weight or number of fruits, tubers, ears, or edible portions, have been nothing less than phenomenal. With tomatoes and potatoes the yields for three successive seasons were increased 33 per cent. With green beans Doctor Flint secured a 66 per cent increase in yield. With other crops yields have in general tended to exceed 33 per cent and on poor soils have frequently been more than 100 per cent. The maximum increases were obtained with sweet potatoes, amounting to an average of 150 per cent over three seasons. In this crop, however, it is assumed that the paper had an additional value through preventing the rooting of the runners.

Although Doctor Flint's experiments were designed primarily to study the "biophysical aspects" of the paper-mulch, rather than to develop improved cultural methods, the practicability of the application became evident early in the tests. The remarkable ability of the mulch to increase plant growth, to hasten maturity, to retain soil moisture and maintain uniform temperature of the soil, and above all to suppress the weeds and eliminate plowing or other preparation of the soil where paper was left from one year to the next—all of

these advantages were so pronounced that this phase of the study could not be overlooked. Accordingly what practical results are available have been made public in the hope that many growers will become interested in carrying out small-scale experimental trials.

Already a number of paper manufacturing companies have become interested in the development of mulching paper of different grades, weights, and prices. At the suggestion of the department they are offering only limited quantities for sale and trial until experimental results have shown more conclusively the kind of paper to use. Most any kind of paper, so far as these experiments show, is suitable for stimulating plant growth if it is free from toxic soluble materials such as tar.

The use of paper as a mulching material marks a new and promising development in agricultural practice. In the past, the soil mulch and straw or plant residue mulches have been thought of primarily as a method of conserving the soil mixture. The effectiveness of paper mulch is no doubt due to other factors as well.

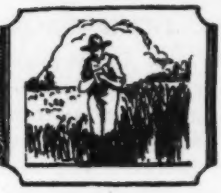
Since the paper is absolutely impervious to light and moisture, it is very efficient in conserving soil moisture. Then again, the black paper readily absorbs heat, and the temperature of the soil in mulched areas is often noticeably higher than that of neighboring unmulched areas. Soil moisture and temperature often are limiting factors in plant development.

Quite as important as the increase in soil moisture, however, says Doctor Flint, is the distribution of the moisture. Under normal conditions a light rain falling on a porous soil is often of no consequence whatever. When such a rain falls on the paper it is drained to the plants and its effectiveness is not lost but increased. Under the paper the top surface of the soil, which is rich in plant food, is kept in a moist condition so that plant roots can feed there; whereas under ordinary conditions this rich area is often unavailable to the roots because of the dry condition, and what is even more harmful the plant roots may be encouraged to start growth near the surface by early rains and suffer from drought later.

Then there is the possibility that the paper mulch exerts some influence on the fertility of the soil through the stimulation of the growth of microorganisms. In one of the tests an area of heavy clay soil of low fertility was planted to sweet corn, half of which was mulched and the other half left for checking results. The corn on the mulched area made a satisfactory growth and the influence of the mulch was noticeable somewhat beyond its actual limits. Analysis of the soil in both areas did not indicate any significant differences in percentage of nitrates; when the Hoffer test for excess nitrates was applied to the plants, however, those from the mulched area were found to be rich in nitrates while the others showed none whatever. Doctor Flint believes the explanation lies in the assumption that stimulated microorganisms produced an increase in available nitrates which was readily used by the mulched plants. At any rate this instance shows the possibility of producing a crop with paper mulch, on soil of low fertility which under the same climatic conditions did not produce a crop without the mulch.

While in all these studies no effort has been made to study the economics of the practice of mulching with paper, it is obvious that any wide use will depend on the cost of the paper and the expense of laying it. There is no question but that crops grow luxuriously with paper and it would seem that the increase in many of the crops would be sufficient to justify the practice. Especially does it promise a new way to "paper money" for the backyard gardener or the truck farmer whose income would be greatly increased by producing an earlier crop, a cleaner product of better quality, and whose cost of production would be materially lowered by the elimination of the tedious and expensive job of weeding.

Pages From A Field Note Book



A Practical Teacher

By J. L. Baskin

L. E. BARNES, Smith - Hughes teacher of the Winchester High School, Winchester, Tennessee, is a great believer in properly fertilizing crops. "I know it pays," he said, as he invited me to visit his corn and soybeans. Located in the outskirts of town on Highland Rim soil, Mr. Barnes had one of the most outstanding demonstrations of what fertilizer means in growing crops that I have ever seen.

When Mr. Barnes related his activities, one could readily understand why his crops were good. He followed his plowing with a disk and then with a planter having a fertilizer attachment. Certified seed corn was planted on the two acres. At planting time 300 pounds of 4-12-4 fertilizer were applied to which 100 pounds of muriate of potash were added.

The reason for this additional potash on this soil, as explained by Mr. Barnes, was because last year his corn had a spindling stalk, blew down badly, and cracked badly at the bottom joints, thus making the ears "windshaken" or "chaffy." There were no stalks like that this year.

As we passed out of the corn-field, we entered a field of soybeans sowed in rows. The beans were of the Laredo variety and had apparently been seeded at two different times, but Mr. Barnes explained that all had been planted the same day, the difference being in the fertilizing. Two hundred pounds of a 4-12-4 showed wonderful results. Where the distributor had clogged the rows were far behind the rows on either side that were fertilized.

Mr. Barnes believes that it pays to fertilize everything in his section of the country and that many farmers are poor because they are trying to wrest a living from a soil too poor to produce economically.

The soybeans on Mr. Barnes' right were fertilized with 200 lbs. of 4-12-4; those on his left received no fertilizer.

HOME-GROWN SEED BEST

A. L. Baumgardner, a progressive farmer of Cabell county, West Virginia, has just completed a test on the adaptation of clover seed. Mr. Baumgardner's test showed native adapted red clover seed to produce a thousand or more pounds of hay per acre above that produced by imported seed.

In 1924 probably 200,000 acres in West Virginia were seeded with unadapted or imported seed. The yield at that time averaged about one ton of hay per acre. Such tests as that conducted by Mr. Baumgardner and the campaigns for adapted seed conducted by county agents and reliable seed dealers have changed this.

In 1926 the average yield was 1 1/3 tons per acre and in 1927 it was 1½ tons per acre. One half of the increase has doubtless been due to favorable seasons. The other half may reasonably be attributed to the more general use of adapted seed. There are 379,000 acres of clover in West Virginia. A 500-pound increase in yield means 94,750 tons of hay worth for hay or soil fertility on the farm $947,500.—E. E. Pittman, Elizabethtown, Ky.

CABBAGE PROFITS

AN interesting fertilizer test with cabbage on a sandy loam soil was completed a short time ago on the farm of Mr. T. M. Puller, a leading truck grower of Elleson, Hanover county, Virginia. Mr. Puller tried three different fertilizer combinations at the same rate per acre on equal areas of ground. He used the same number of rows of the same length and took the weight of 100 cabbages from each plot, using the rows near the center of the plot in each case and taking them as they came. Knowing the number of plants set per acre, he was then able to calculate the rate of production per acre.

His results are as follows: Plot 1 = 12,000 lbs. cabbage per acre sold for $240.00; Plot 2 = 16,800 lbs. cabbage per acre sold for $336.00; and Plot 3 = 19,200 lbs. per acre, sold for $384.00. The three different fertilizer mixtures were as follows, and the same sources of ammonia and phosphates were used in each one: Plot 1 received 1,500 lbs. of 6-9-0; Plot 2 received 1,500 lbs. of 6-9-5, and Plot 3 got 1,500 lbs. of 6-9-10. The cabbages were more even in size and were ready about two weeks earlier on the third plot than on either of the other two. Evidently a complete fertilizer is the thing for cabbages in that section. The addition of potash to the phosphate and ammonia resulted in the increases in yield and value as stated above.—W. L. Myers, Richmond, Va.

J. A. Fortin, agriculturist for Champlain Co., Que., holding in his left hand an average potato from a row where no fertilizer was applied, the distributor being plugged. In his right hand is a potato from a hill that received 1,800 lbs. per acre of a 6-8-12 fertilizer. The picture was taken during a recent tour of Canadian agriculturists through the famous Aroostook Co. potato district. The gentleman on Mr. Fortin's left is Roy S. Libby, Caribou, Maine, in whose field this striking difference in growth, due to fertilization, was noted.

South Dakota Soils

(*From Page* 30)

good land to work could not make the necessary outlay of money to put the soil in proper condition. It may be proper to note that the business men were no more prosperous than the farmer, and all the descendents of a one time prosperous people suffered alike.

The fertility of South Dakota land is decreasing, the same as it has decreased in other states. There is no reason to believe that it will not run down in fertility to a point where it will be impossible to make a living farming it unless a definite system of farming which will maintain fertilty is adopted and followed consistently. We are fortunate in being able to grow a wide variety of legumes and in being able to use them to such splendid advantages in livestock feeding, which is now our major industry. However, this can not be accepted as the final solution to the whole problem, as it can at best take care of only the element nitrogen, and we will need phosphorus in considerable amounts and potash and lime to keep the elements properly balanced.

Fertilizer Turns the Trick

(*From Page* 29)

Comments from two of the leading fertilizer dealers made to the county agent gives some idea as to the effect of the campaign. The agent asked one of the dealers for an advertisement for the county fair catalogue. His reply was, "What's the use of me advertising when I have one thing to sell and you recommend another which I do not carry? Why I had a man drive away from my place a few days ago because I did not carry the fertilizer you recommend and nothing that I could say changed his mind in the least. He had to have what you recommended." Another one said, "I will have to hand it to you. You sure did wake these farmers up on the fertilizer question. I never sold as much high analysis and complete fertilizers in my life. I had ordered a little as per your request, but my scotts! I could hardly keep in the stuff. Your propagandar is right in keeping with my ideas. I am glad you've got them going."

The idea of a balanced ration for plants was tried out on everything from gardens to meadows. Potato yields were increased from 50 to 100 bushels per acre; tomato yields were increased 25 to 50 per cent. One man reports a yield of 55 bushels of corn per acre where he used a 4-16-4 fertilizer and 35 bushels where he used straight 16 per cent superphosphate in the same field.

A wheat field in one community on which 300 pounds of a 4-16-4 fertilizer were used produced a yield which was the largest in the community and doubled more than half of the yields gotten by other farmers. The threshed grain from this field weighed out two pounds per bushel more than the standard for a measured bushel, while nearly all other wheat in the same community weighed from two to six pounds under the standard. Probably the dif-

ference would not have been so marked had this not been a very poor wheat year for this section. Anyway, the fertilizer proved good insurance for this farmer.

A timothy and clover meadow on which 300 to 400 pounds of a complete fertilizer was used yielded 2½ tons of a first-class hay per acre, while the average for that community is 1¼ tons.

On another field the timothy sod was top-dressed in the spring with 100 pounds of nitrate of soda and 200 pounds of 16 per cent superphosphate per acre. The difference in growth was 100 per cent. This check could be seen as far as one could see the field.

Farmers should study their conditions and soils and apply the thing that will give best results. Successful agriculture depends more upon economic production than anything else. There is no economy in cultivating two acres to get what one will produce if properly cultivated and fed.

Certified Potato Seed

(*From Page* 28)

age of 20.5 per cent of the hills were affected only moderately by rhizoctonia, while in strain II 87.1 per cent of the hills were severely attacked by the disease.

This difference in percentage of rhizoctonia in the two strains can hardly be attributed to infected seed. There was no evidence of sclerotia on the seed in either case, and instances are well known where untreated seed badly infected by rhizoctonia has been planted at Hastings with no detrimental effect upon the growing crop. It is equally noteworthy that clean seed planted at La Crosse under certain conditions may show severe infection in 85 to 90 per cent of the hills. It is difficult to explain this difference in the two areas since the Hastings section has a higher percentage of soil moisture and lower soil temperatures at the time of rhizoctonia infection. But this is not pertinent to the problem.

The most satisfying explanation for the difference noted in the two strains as regards rhizoctonia infection is that based upon the relative vigor and growth. The plants in strain I came through the ground more quickly than those in II. Richards* showed that the rate of growth at this stage was directly correlated with rhizoctonia infection, the slower growing plants showing the higher percentage.

A number of hill secetions were made of both strains at the time of harvesting. These were sent to P. M. Lombard at Presque Isle, Maine, to be grown out during the summer of 1928. Progeny from these will be planted again in Florida in order to observe essential differences.

The facts related above may serve to stimulate more careful thought on the part of the potato grower when he buys his seed potatoes. It certainly emphasizes the need for more research in discovering and propagating certain strains showing a peculiar adaptation to certain climatic and soil conditions. It shows quite clearly that certain inherent plant characteristics showing wide variations under different environment conditions are bound up in seed potatoes, and that these important factors are beyond the ken of present methods of seed certification.

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* Richards, B. L. Further studies on the pathogenicity of Corticium vagum on the potato as affected by soil temperatures. Jour. Agr. Res. 23: 761-770, 1923.

Below: This cotton, well fertilized, received in addition a side-dressing of nitrate of soda and potash.

Above: Poorly fertilized cotton, typical of large areas in the Coastal Plains area this year.

Lightnin'

(*From Page* 21)

one of the farmers expressed it are rust and wilt, which are more prevalent in the Coastal Plain sections this year than during any other season. They have doubtless been accentuated by the lack of proper fertilization to begin with, and the heavy rainfall conditions prevailing during the growing season as an important secondary and contributing cause. Cotton must have a liberal ration of well-balanced fertilizer to grow and develop normally. The lack of any one of the essential plant food elements brings about an abnormal condition in the plant.

The condition referred to is caused by a lack of sufficient potash, more than the lack of any other single necessary plant food.

While the impression has been given by some, both white and colored farmers, that kainit is the only source of potash that will control rust or give better resistance to wilt, it is known that other sources of potash are just as valuable in this respect as the crude salt of kainit. Especially has this been demonstrated in Arkansas and Mississippi, where wilt and rust have been studied rather extensively.

Thousands and thousands of acres in the Coastal Plains of the Carolinas, Georgia, and Alabama are affected this year and conditions similar to those shown in illustration No. 2, where, due to lack of plant food in sufficient quantities and properly balanced, from 10 to 15 acres will be necessary to make one bale.

On the other hand, similar soils properly fertilized on adjacent or nearby fields, such as are shown in illustration No. 3, will make a bale or more per acre due to different fertilizer practices.

CAT ADOPTS "POLE" KITTENS

Alva, Okla.—Ward Chase, Vocational Agriculture Instructor of this city for Alva and Northwestern State Teacher's College high schools, is claiming the Oklahoma championship for a side line to regular project supervision. Paul Weibner of N. W. S. T. College high school, who has wheat as a regular project, is claiming his instructor's time to observe his cat that has one kitten and two adopted skunks. The skunks are doing nicely and do not resent handling by Paul according to the "aggie" instructor.

Go West, Young Man, But Not Too Far

By Lee VanDerlinden

Chicago, Illinois

AMERICAN people in general are led to believe farming is in a bad way. This opinion has been brought about by certain politicians, as well as by information given out by some farm organizations. We are especially asked to believe that farmers in the Northwest, or in Iowa, Minnesota, North and South Dakota, Nebraska and Kansas, which states comprise the important wheat, corn and hay belts of the United States, are suffering from the past economic change which came as a result of post-war deflation.

However, the writer feels that, like Mark Twain's death, most of these stories are "exaggerated." A trip through these states fails to disclose great suffering. There is no doubt that farmers in these states are paying interest on a great deal of paper held by banks. But so are farmers of Maryland, Indiana, Texas, California, and all the other states. And so are the business men all over the country.

Farmers in the Northwest are handling more money per acre, generally, than they ever did with the exception of the war years. But, the habits of the farmer changed with the war. He wants, and has, many luxuries now, that it was impossible to have a few years ago. The farmer of the Northwest today enjoys the automobile, various magazines and newspapers, moving picture shows and other entertainments that his predecessor of but 25 years ago could not have.

His hours are not as long as they used to be. It may be true that hired help costs more now, that taxes are higher, and that machinery is still high. But, this new machinery enables him to farm more acres with less help; it enables him to grow more bushels per man. And it is because his wants are greater now than ever before that many are convincing themselves that farming is not as profitable as it used to be.

In this general discussion, let us not forget that much of the credit for the present condition of prosperity is due the agricultural college people, the county agents, and the teachers of vocational agriculture, who have worked untiringly to keep up the production of various crops, despite the fact that the store of plant foods in the soils are being so rapidly depleted, and not very much being replaced. This has been accomplished by the improvement of seed, by weed control, and by the various experimental work carried on by these untiring workers.

Corn is now being matured in parts of these states where it was believed impossible just a few years ago. Sweet clover and other legumes have been introduced, and liming has become a widespread practice, in the last few years. Crops are not always good, for this region sometimes suffers from a lack of water, but on the whole the Northwest is a wonderful farm territory, with plenty of opportunities to all who wish to work. These farmers have money and can pay their bills. A few are being sold out, it is true, but mostly they are the ones who have no interest in farming, and who were not farming as well as they knew how.

For the man who wishes to buy a farm, where the opportunities are unlimited, say to him as did Horace Greeley, Go West, young man, go West.

But I would add to this not too far West, stop off at one of the Dakotas, Kansas, Nebraska, Iowa, or Minnesota.

For there's money in those hills and plains.

The Right Way

(*From Page* 13)

broadcast section of the field yielded at the rate of 21.7 bushels per acre, while the hill fertilized corn yielded 73.5 bushels per acre. In addition, stalk tests revealed that the limiting factor at this rate of yield was an insufficient supply of potash. Twenty pounds of K_2O were inadequate for a yield higher than 73.5 bushels this season. Accordingly, Graham is planning to use larger amounts of potash next year in his hill fertilized corn.

Which Wheats Are Best?

(*From Page* 27)

and texture of loaf. It was one of the three classes averaging lowest in ash content of flour.

"White wheat did not excel in any factor. Its best points were its high color score and low ash content of flour. It averaged lowest in volume, weight, and texture of loaf, and second lowest in test weight per bushel and crude protein content of wheat, and in water absorption of flour."

Michigan

(*From Page* 12)

tion. A row of barley planted between every fifth or sixth row of onions will give fair protection to the onion crop. Permanent windbreaks may be obtained through the planting of rows of shrubs or trees. Norway spruce, white cedar, box elder, and willow may be used for permanent plantings.

Plant varieties of major importance have been developed at the Michigan station. Perhaps the best known of these, Rosen rye, has so completely replaced other varieties in this state that it is practically impossible to find a field of rye which does not plainly show that it has drawn upon the store of quality present in the few seeds of this variety originally planted at the station. The desirable characteristics of the rye has led to its wide distribution throughout the country, and the same characters have made it a consistent winner of first place at the International Hay and Grain Show.

Robust beans, a variety resistant to blight and anthracnose and immune to mosaic, is another plant variety which is widely used in Michigan and other northern, bean-producing states. This variety made almost a clean sweep of the prize money in its class at the International last year.

Red Rock wheat, a variety developed on the station, is one of the leaders in Michigan. Berkley Rock wheat is a high yielding variety with an unusually high gluten content for a winter wheat. One milling company in Michigan bought all of this variety which they could obtain, and sold the flour produced from it abroad where the flour was used for bread prescribed for invalids. These millers, by paying a higher price, have encouraged the planting of this variety in the area where the mill is located.

Several varieties of oats which are popular in the State have been produced by the plant breeders at the station. Spartan barley, a smooth-awned white variety is a recent production of the department. When canners in the

State complained that the common varieties of red kidney beans did not make a satisfactory appearance when canned, the men at the station found that the beans contained strains of beans which bleached when cooked. Selective breeding produced a variety of red kidney beans which are fast color.

Varietal tests of clover and alfalfa have saved Michigan farmers from great monetary losses which formerly resulted from the planting of unadapted varieties. Residents of the State now have no excuse for sowing seed which will not produce a satisfactory crop. The station plant breeding work has been the basis for a development of certified seed service in Michigan which not only furnishes seed for farmers here but also for thousands of farmers in other States.

The effect of cultural practices on a crop has received its share of attention. Experimental work with sugar beets shows that fall plowing materially increases the yield, and that when land was plowed eight inches deep it yielded one ton to the acre more beets than when plowed six inches deep. Fields of beets blocked carefully to bunches 12 inches apart and thinned to the strongest plants produced four tons to the acre more beets than similar areas blocked and thinned according to common practices. Field men representing the sugar manufacturers attend schools each year where they are informed by members of the staff of the proved practices that are recommended for use in the field.

The increased use of alfalfa in the state soon proved to the growers that hay making methods in use formerly were not entirely satisfactory for making a high quality of alfalfa hay. Investigations by the crops department led to the recommendation of a method which included the raking of alfalfa soon after cutting, and curing the hay while it was in loose windrows. The hay, then, could be loaded from the windrow with a hayloader. The method proved entirely practical. It resulted in a better grade of hay, little shattering of leaves, and less expense for the operation.

An investigation by the dairy department concerning the mineral requirements of growing animals has shown that bone flour furnishes all the minerals needed by animals which are receiving a normal ration. It has also been shown that animals which receive a mixture of ground raw rock phosphate and lime rock are seriously injured. Animals which are fed this mixture for a long time have faulty teeth which are so sensitive that it is necessary to warm their drinking water in winter before the animals will drink. Even in summer, these animals lap water like a dog instead of drinking normally.

Another experiment has proved that the so-called cotton seed injury, which has been the subject of many experiments, is not caused by any deleterious properties of the cotton seed meal, but is a disorder which is caused by over feeding of concentrates. Identical symptoms of physical deficiencies can be noted in animals which are fed other concentrates and an insufficient amount of suitable roughage.

Soils Needed Lime

Many Michigan farmers who wished to grow alfalfa several years ago found that the acidity of their soil would have to be corrected before a satisfactory stand of the legume could be obtained. The cost of applying lime, however, proved to be a stumbling block in numerous instances. Marl deposits were plentiful in the state but there was no satisfactory method of getting the material in quantities from most of the beds.

The agricultural engineering section of the station was given the project of perfecting equipment which would enable a group of farmers to get out the marl needed to prepare their land for planting legumes. The depart-

ment designed machinery which was inexpensive enough so that it could be used by small groups and which would satisfactorily do the work. To familiarize farmers with the machinery, a model rig is sent out from the College in charge of members of the department to dig marl from beds located in many sections of the state.

The mole drainage project now being carried on by the department promises to be of great economic importance to the farmers of the state. The station work on the project indicates that a drain which will give satisfactory service for two or three years can be placed by this method in clay soil at a cost which is less than the interest charge on the money which would be invested in a tile drain.

The department is cooperating with the engineering experiment station and a public utilities company in an investigation of the adaption of electrical power for use with farm machinery. Last year's work on this project proved that electric power is an economical and satisfactory form of power for filling silos.

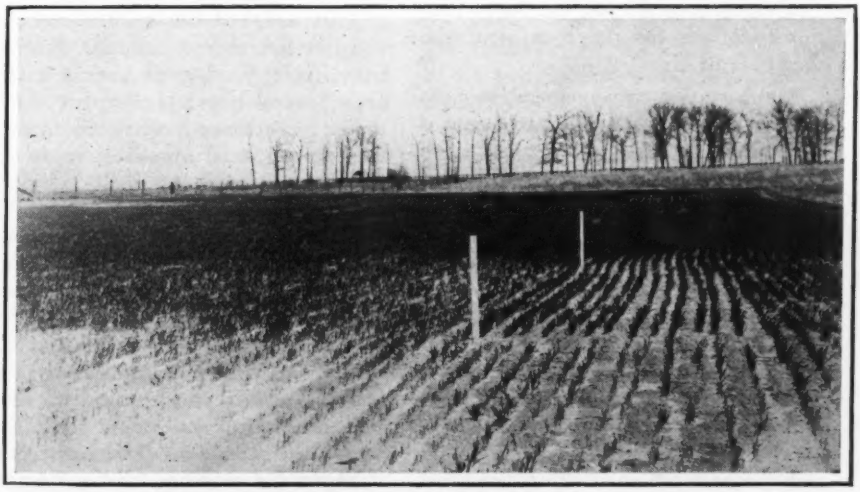
Old theories concerning the pruning of mature apple trees proved fallacious after a systematic study of the effect of severe pruning upon the yields, of bearing trees. Orchardists of the State are now advised to use extreme care in pruning producing apple orchards, and that a heavy pruning is directly reflected in a decrease in yield.

The old quarrel between the owners of bees and the horticulturists who were forced to use poison sprays to save their fruit has been made less rancorous in Michigan by the studies of station workers which show that, in many orchards, bees are necessary to insure a paying crop of fruit. One of the largest canning companies in the state rented 200 colonies of bees this year to be placed in their own orchards, and many farmers now own or rent bees to carry pollen in orchards planted with large flocks of self sterile varieties of fruit.

Variety testing and breeding of varieties of vegetables has been of material assistance to the truck growers of the State. One of the best known developments of this work is the John Baer tomato which is now widely grown for canneries in this and other States.

Control of Insects

The difficulties encountered by the entomologist at the Michigan station sometimes bring him to a mental state



Cass county plots. The plot in the foreground received no treatment; the middle plot limestone; the plot in the background limestone and 400 lbs. of complete fertilizer.

in which he expresses a desire to visit that promised land, "where there's never rain or snow, nor ever wind blows loudly." His problems are complicated by a climatic variation that brings fruit trees into blossom at the south end of the fruit belt two weeks or more before trees reach a similar stage at the north end. Spray recommendations that are correct for South Haven are not applicable at the same time at Traverse City. Latitude, altitude, and the influence of the Great Lakes combine to make a climatic puzzle.

To enable worth while information to be given on the control of fruit insects, it has been necessary to do a great deal of work in the determination of sections within which trees are at a similar state of growth and insects are at an identical stage of development. Thirty observatory stations have been placed at strategic points of the fruit belt to determine the date of emergence of the second brood of the codling moth. As the insects emerge, spray warnings are sent to the growers within the area which is climatically similar to the point at which the observatory is stationed. The success of this system during the past few years has led to the establishment of similar observatory stations as a basis for spray recommendations for the control of the cherry fruit fly.

A sub-station as a cooperative project with other college departments is maintained at Monroe for research work on corn borer control. This pest together with the Mexican bean beetle which finally has invaded Michigan are present major problems for investigation.

Research in Disease

The capital invested by Michigan farmers in dairy herds needs the insurance given by a continuous study of the disease affecting dairy cattle, and the research men of the veterinary and bacteriology sections have given material assistance in disease control work. One of the best known projects has been the work done on contagious abortion of cattle. Thousands of tests of blood samples are made in the college laboratories each year, and, recently, a more efficient and rapid agglutination test has been developed. Another test for the determination of animals immune to the disease shows great promise at the present time.

A member of the staff has developed a new remedy for the treatment of internal parasites. The remedy is being thoroughly tested and its use has proved it to be satisfactory. The preparation is being prepared commercially by a firm of manufacturing chemists.

Commercial chick hatcheries and the importance of the poultry industry to the state have made it necessary to do an immense amount of work on the control of poultry diseases. Blood tests for the determination of bacillary white diarrhea are made in the college laboratories. A nominal charge is made for the tests, and the number made can be judged by the receipt of more than $1,500 for making the tests last year.

Many Other Lines

This story of the station activities can not give a just account of many lines of work that are being carried on. Several departments that are of major importance have not been mentioned, and it is impossible to do justice to the work of each individual on the staff within an article of this length. Research workers, however, have become accustomed to perform their tasks with a minimum of credit, and their work is usually given proper credit only when it has been applied in the field for years; and when someone discovers that a test tube, a little plat of ground, or a few seeds contained the magic which has materially changed the practices and rewards of the agricultural industry.

Victuals

(*From Page 4*)

He who writes the songs of a nation may be very effective, but she who selects its sustenance is the final arbiter of destinies.

Custom has laid down the law that he who works must eat, but not always has it been possible to enforce the other edict that he who eats must work. There have been far more workers going hungry than there have been overfed men at work. I am not opening any socialistic plea at this point, however. Suffice it to mention the fact that the real cause of the fall of Rome was the practice of feeding a large part of the population in idleness at the expense of the state. If we put on a few more armies of food and drink inspectors in America our doom may be sealed for similar reasons.

In my exhaustive prehistoric researches in the most redundant encyclopedia I have, it says that the cliff dwellers had a sort of "cave-e-teria" system, embodying the snaring or stoning of a few hapless fauna and toting them back to a hole in the wall. After their supplies of moss and mushrooms for salad and nuts and ground cherries for dessert grew scarce, they used more ingenuity and slowly devised more effective lunch hooks. Instead of remaining collectors they graduated from the antique business and soon became gardeners and herdsmen. From this it was but a step to the life of the pastoral nomad whose wanderings were determined largely by his need for provisions.

Man's economic and social progress have mostly come through his conquest of nature. The human engine had to be stoked regularly and there had to be plenty of fuel for the stiffest grades.

Little if any intelligence marked the early days of mankind in relation to food. Some of that early zeal for rapid reception clings to us still, but we are at least less noisy about it than our ancestors. Even our boarding houses have largely discarded the Marquis of Queensbury rules.

By and by mankind learned that the soil which grew the food and the human system that received it merited some consideration. The naked fallow system of land resting was slowly adopted and at the same time a few of the heaviest feeders were obliged to take time out. Hence they began to fast.

WHEN the fallow and fast failed to do all that was expected the later generation under Roman influence in Britain gave the land a diet of legumes and the stomach a diet of more varied victuals. And now we have reached the vitamin-mineral stage of food progress, while the land around us receives more thoughtful replenishment.

Within the limits of a short dissertation on dessert like this must be, one cannot give a course in dietetics, gastronomics, or diabetes. The nub of the subject lies to my notion in the change in our attitude as a generation toward victuals. We have come to think of their *quality* and their *health promoting* and *protective* attributes.

Of course, a few of my acquaintances still adhere to the fallacy that the test of a good meal is the pressure exerted on the vest buttons, but I have ceased to invite them over. Our menu is run on the *once around* service plan, and we hold out no deluding promise of more down cellar in a tea cup.

In this I am making no attack on the corn pone, hoe cake, and venison of Daniel Boone and the conquerors

of the continent. They had to take a lot of punishment and absorb nourishment accordingly. But that they escaped pyorrhea and restaurant fare is often overlooked. And as far as stamina is concerned, many of our statesmen can filibuster as long after a breakfast of corky crisps as the Continental Congress could do on a Virginia table d'hote dinner. Compare the tons of victuals that Columbus carted over with the small sandwich package that was taken back by Colonel Lindbergh. It isn't what you eat, but what you don't eat that saves you.

Lack of food used to be the greatest terror known to man. Bad food has since been proved to be a far worse catastrophe. The genius of science and the progress of machinery have combined to strengthen the arm of the producer, so that as far as this nation is concerned we seem to hear more about surplus than deficiency. This is well, because it gives the folks bent on quality consignments a better chance to pick and choose.

My grocer points to the label, "Food and Drug Act of June, 1906," and declares that his potted ham and canned beans are certified by Congress. Here and there he may be mistaken, but on the whole he is right. The Spanish American War bully beef scandals and the upheaval of noisome stories in the stockyards and packing plants started a Klean Kitchen Klan movement that worked wonders. Deleterious preservatives and poisonous coloring compounds went down to defeat and raised the standard of public opinion. While it could not stop the greasy cooking in private life, the general effect has been toward merit and moderation in the way we absorb provisions.

Most blessed of all, it paved the way for the opening of those college courses that made classics out of custard pies and poems out of pork chops. The rise of the culinary curriculums taught us that the "why" and "what" of eating was as important as the "when." The first timid overtures of this kind, relegated to side rooms and offered with apologies, were called "domestic science courses." Since then they have been brought to the front of the building and are known as "home economics degrees."

Such an army of women who treasured recipe books as much as their mothers hung to love letters could not help but affect the hygienic welfare of the populace, and they have done much to rid the marriage vow of the leaden threat of bridal biscuits.

THE general effect of quality victual campaigns and lessons on vitamins and variety are even observed in the erstwhile pork-sausage-and-sinker sections. Farm folks may be poorer paid than of yore, but they are far better fed. Nowadays I get some of my most pleasing meals (outside of our own domicile) where farm women spread milk dishes, green salads and raw fruits among the heavier pastries. (The above parenthesis was needed to preserve domestic serenity.)

The protective properties of human food are equally evident in modern home literature. The milk men saw it first and got the head start on their beefy brothers in capitalizing such virtues. Unfortunately, it started a lot of bother anent what substitutes the householder could safely use when prices of the "only original" soared too high. Unless they page another Volstead to introduce another arbitrary limitation ordinance, I am afraid many people are going to be independent in this at the risk of losing their normal plane of nutrition.

Whichever way that little side issue may be settled concerns me not. My chief premise is that certain foods are known to be protective above others, and that the fellow who wrote the adage about the "apple a day" and the absence of the doctor was a century ahead of his time. It may take

a crate of oranges to equal one box of pills, but who wants to eat the pills?

I dare not enter too technically into this theory of the protective qualities of grub. The reasons are obvious. I must remain at a distance and admire the work of others. Besides, I am more familiar with Feeds and Feeding and you are not asking the advice of a veterinarian.

Mineral intake is a little abstruse to me yet. I have endorsed the use of salts for the soil and I believe that onions and such plants become stronger through the use of minerals. Yet I am aware that minerals for mortals are getting to be quite "it." Iodine is idolized and calcium is capitalized.

I had an infant cousin once who ate dirt. I tried a mouthful just to be chummy, but I decided that I had inherited all the grit required from my Scotch-Irish ancestors. Where she made her error in the experiment was in acquiring it from original sources. It is not thus advocated. Minerals must go through a perfect filter of tissues in the vegetable and animal kingdom before I can get any kick out of them. I am willing to eat at the third or fourth table under these circumstances without murmur.

"Tell me what you eat and I will tell you what you are"—"The hand that stirs the ladle is the hand that rules the world"—"Digestion waits on appetite, and health on both"—"When eating here watch your hat and overcoat!"

One could go on quoting and paraphrasing numerous wise saws and modern instances concerning the potent part which viands play in the life of man.

But after all the research and wisdom has been spilled, the most of us lean back in our chairs and dream quietly of those olden golden days when patient old Father called in his firm and resonant voice at the foot of the stairs on winter mornings: "Bill, get up now, breakfast is ready." After summoning up all your resolution in a swift plunge for your pants, you opened the bedroom door and got a whiff of griddle cakes, oat meal, and milk toast, and you heard the kettle singing on the hob. And when you came down with tousled hair, Mother was standing there in her benevolent majesty ready to fry and bake and parboil from sun-up to sun-down for a hungry family of heedless, growing children..

Much as I revere those sacred rituals of the cook stove and treasure them in memory's record, I earnestly admonish you not to repeat to your wife those brooding words: "These are not like mother made!"

Just notice how deeply satisfied your children are over the provender which your table supplies, and then realize that your wife is your mother's successor as high priestess of the sideboard. When they grow older and take on dyspeptic habits, perhaps they will in their turn invest your wife with the glamor of Rector's or Delmonico's.

Good food is like old friends—we remember the whipped cream in their make-up and soon forget the burnt crusts.

SO as you eat Plymouth Rock rooster in honor of the Pilgrim Fathers on the craggy coast, try to recall the rest of that honored Highland blessing which runs: "for we hae meat and we can eat, for which the Lord be thankit!"

But before you sweep the crumbs away, there may be a few baskets of victuals to fill for those who are not financially able to discriminate between vitamins A, B, C, or X. And if there are such within the reach of your bounty, so much the merrier will your feast become.

For no matter how widely some of us are separated by artificial things, we are all kin in the kitchin!

"Nose Wipin" Free

An enterprising youngster has started a new business.

His business card gives the following information:

Mr. Gerald Allen, Jr.
Personal Escorter
Tots and Kiddies took
to school and returned,
prompt in perfect cond-
dishin—if received that
wáy. Military discipline.
Rates 25c a week. Refined
conversashin. No extry
charge for nose wipin.
All I ast is a trial.—*Tawney Kat.*

Gentle hands were lifting Pat from the wreckage of his automobile, which had just been struck at a grade crossing by a fast passenger train.

"How did it happen?" asked a friend, who was with the rescue party.

"Begorra," fumed Pat, "'tis more than Oi can understand. Ye'd have thought that the engineer of the train could have seen me comin' in broad daylight!"

Cash and Carry

A dusky lady hurried into the drug store the other day and said she wanted a cent's worth of insect powder.

"But, lady," said the druggist, "that's not enough to wrap up."

"Man," exclaimed the lady, "Ah doesn't ax you to do no wrappin' up —jus' blow it down mah back."

SOPHISTICATED

A little boy from Canada, who had never seen a negro, was riding in New York with his uncle when he spied a colored lady.

"Uncle, why does that woman black her face?"

"She doesn't; that's her natural color."

"Is she black like that all over?"

"Why, yes," uncle replied.

The boy looked up beamingly at his uncle. "Gee, uncle, you know everything, don't you?" — *Typo Graphic.*

"I shall die," throbbed the suitor, "unless you consent to marry me."

"I'm sorry," said the maiden kindly but firmly, "but I will not marry you."

So the fellow went out West and after sixty-two years, three months and a day became suddenly ill and died.

"The best thing for you to do," said the doctor, "is to give up smoking, drinking anything but water at your meals, late hours—"

"Wait," entreated the patient, "what's the next best thing?"

Swallowed His Destination

A Negro employee of the express company approached his boss with the query:

"Boss, what we gwine to do 'bout dat billy goat? He done et up where he gwine."

Potency Proved by Exhaustive Biological Tests

The two rats shown above are of the same age and received the same ration, except that the larger rat received also a small dose of NOPCO Oil daily.

The bone at the left is taken from a normal rat. The bone at the right from a rat suffering from Vitamin D deficiency. Note the wide band of soft cartilage in the bone at the right.

PURITY and potency can never be taken for granted in cod liver oil. In the Nopco Laboratories, every Sample of oil must run the gamut of a series of searching tests.

The sample is taken from a large tank containing approximately 12,000 gallons of Cod Liver Oil kept constantly in motion. Such a sample is truly representative.

The first test is made in the chemical laboratory to establish purity and conformity to U. S. Pharmacopoeia specification.

Vitamin potency is determined by conducting two feeding tests on white rats in the biological laboratory: One for Vitamin A, prescribed by the U. S. Pharmacopoeia, and one for Vitamin D. The latter test was developed in the Nopco laboratory and is a preventative test.

Finally, a proving test is made by actually raising chicks in an inside room without windows, the only light coming from electric bulbs. The chicks are placed in the battery brooders as soon as received from the hatchery and are kept there until eight weeks old.

Those receiving NOPCO Cod Liver Oil at the rate of ½ of 1% of the ration must show no sign of rickets. If they do the Oil is sold for industrial purposes.

Readers of BETTER CROPS are cordially invited to visit our laboratories and witness these tests.

Send us your name and address; we will place you on our mailing list to receive the NOPCO Bulletin, issued monthly.

The alert bird at the left received ½ of 1% of Nopco Oil, the bird below received none.

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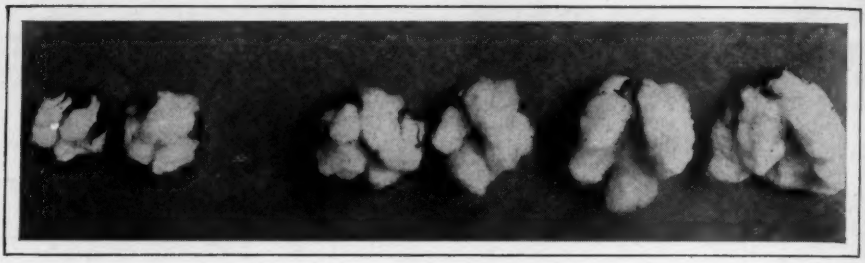
The Cod Liver Oil of Proved Potency



Bigger *and* Better

Examine carefully the results of boll counts made on demonstration plots on three Alabama cotton farms:

Ira Thompson, Troy
Norfolk Sandy Loam Soil
800 lbs. 8-4-4 at planting

TOP-DRESSER PER ACRE	BOLLS PER LB.
200 lbs. 0-8-8	98.7
200 lbs. 0-8-16	93.4
200 lbs. 0-8-32	94.7

W. H. Williams, Andalusia
Norfolk Sandy Loam Soil
800 lbs. 8-4-4 at planting

TOP-DRESSER PER ACRE	BOLLS PER LB.
200 lbs. 0-8-0	100.4
200 lbs. 0-8-16	97.0
200 lbs. 0-8-32	86.6

C. B. Livingston, Kellyton
Cecil Clay Soil
500 lbs. 13-2-5 at planting

TOP-DRESSER PER ACRE	BOLLS PER LB.
200 lbs. 0-13-0	82.5
200 lbs. 0-13-13	74.9

HUNDREDS of demonstrations throughout the Southeast this season show that top-dressing cotton with potash produces bigger and better bolls. Potash top-dressed plots produced: more bolls per acre; fewer bolls per pound of lint; longer and stronger lint; and cotton that was easier to pick.

The cotton in the above photograph was grown on the farm of Z. V. Pate, of Laurinburg, N. C., and all of it received a basic application of 800 lbs. of 8-4-4. The bolls were typical of three different plots. The left two bolls received 200 lbs. per acre of 0-9-0 top-dresser; the center bolls received 200 lbs. of 0-9-16; and the right bolls received 200 lbs. of 0-9-32. Potash top-dressing pays!

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